DALTONIANA

NEWSLETTER
OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

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THE LAST PAGE OF THIS ISSUE IS THE LAST CALL FOR PAPERS FOR THE 7TH INT. IRGCVD SYMPOSIUM IN GENEVA, JUNE 1983 - NEW DEADLINE 15TH FEBRUARY

LITERATURE SURVEY

Colour discrimination at threshold : The approach through increment threshold sensitivity, by D.B. KIRK (Vision Res. Lab. Box 56, University of Michigan, Ann Arbor MI 48109, USA), Vision Res. 22, 713-720, 1982.

Experimental results are presented to support the original concept of Stiles, confirmed by others, of a close correlation between the π mechanisms and colour discrimination at threshold. For two wavelengths to be discriminable at threshold evidence was found of involvement of two separate π mechanisms; in particular the excellent discrimination found between π_4 and π_1 and π_4 and π_2 implied differential cone inputs to those π mechanisms. The data is consistent with the suggestion that the increment threshold approach can involve isolated visual channels. - Janet Voke.

Rod-cone interaction in the dark-adapted fovea, by B. DRUM (Department of Ophthalmology, George Washington/ Univ., Washington D.C. 20037, USA), J. Opt. Soc. Am. 71, 71-74, 1981.

The foveal cone threshold was significantly lower after 45 min of dark adaptation than it was near the start of the cone plateau of the dark-adaptation curve. A concentric rod background subsequently raised the threshold by an amount correlated with the difference between the cone plateau and the dark-adapted thresholds. Paradoxically, the rod background also lowered the cone threshold by an amount that differed from subject to subject. This sensitizing effect was identifiable by its relatively small variability across sessions. These results show that adaptation of parafoveal rods by either real light or dark light can change foveal cone thresholds. - The Authors.

Interactions between spectrally different cone mechanisms, On the clinical applicability of psychophysical and electrophysiological tests, by E. ZRENNER (Bad Nauheim/ Frankfurt a.M., FRG), Docum. Ophthal. Proc. Series, 31, 287-296, 1982.

In congenital and acquired color vision deficiencies either the function of the three spectrally different cone mechanisms itself or their various modes of interaction can be affected. Several methods can be routinely applied. (1) In the presence of strong white background, a three-peaked spectral sensitivity function is revealed : each peak has a narrower spectral bandwidth than an individual cone pigment. Accordingly, the magnitude of the dips between the peaks is an indicator for the strength of opponency between antagonistic cone mechanisms, thereby providing measure for the function of the laterally connected neural elements. The cone antagonism turns into synergism at higher flicker frequencies; this mechanism changes the multi-peaked sensitivity function into a single-peaked one; application of flickering monochromatic stimuli thereby provides a measure of the temporal functions of the color-opponent pathways. (2) In normal trichromats, the long-wavelength sensitive cones control the sensitivity of short-wavelength sensitive cones. The proper functioning of this interaction between the cone mechanisms can be determined by psycho-physical threshold measurements. (3) Using Westheimer's (1965) paradign it becomes possible to investigate the spatial interactions of spectrally different cone mechanisms also for clinical purposes. Marked differences between the short- and long-wavelength sensitive cones point to different modes of interaction. - The Author.

Advices for making a modern anomaloscope (Konstruktionsvorschläge für ein modernes Anomaloskop), by W.O. BOCKELMANN (Tituscorso 6, D-6000 Frankfurt/M. 50, W. Germany), Klin. Mbl. Augenheilkunde 181, 290-293, 1982.

Three designs for a new anomaloscope are described briefly. In each, light in 3 channels is monitored and regulated by a microprocessor; interference filters establish the colors. Claimed advantages over the Nagel are sturdiness, automatic calibration, a wider range of diagnostic procedures, and the capability of measuring saturation thresholds and spectral sensitivity. No reports of clinical tests are given. - C.R. Cavonius

Color vision test with Neitz Anomaloscope OT, by K. FUKAMI (Dept. of Ophthalmol., Kyoto Prefectural Univ. of Med., Kyoto, Japan), Folia Ophthalmol. Jpn. 32, 842-845, 1981.

A new anomaloscope, named Neitz's Anomaloscope OT, was devised by Ohta et al. using 3 different interference filters. These produce yellow light and a mixed color light with red and green. This anomaloscope is handy and less expensive. Using this anomaloscope 14 protans and 71 deutans were tested, and the results of this experiment were compared with the results of examinations with Nagel's

anomaloscope upon the same subjects. The results of these examinations with the two anoamaloscopes agreed with each other. Neitz's Anomaloscope OT is not at all inferior to Nagel's anomaloscope. - Yasuo Ohta.

Colour perimetry : Method and diagnostic value (Farbperimetrie : Methode und diagnostische Bedeutung), by J. ZIHL and J.C. MAYER (Max-Planck-Inst. für Psychiatrie, Neuropsychol. Abt., München, FRG), Nervenarzt 52, 574-580, 1981.

The authors try to find out if cinetic perimetry with colour targets can bring in cortical lesions diagnostic information not affored by usual white perimetry. The results show that the fields for colour and white targets can dissociate. In a group of patients with normal standard field there was a homonymous superior quadranopsia for colour. On the other hand subjects with homonymous superior hemianopsia at standard perimetry had complete hemianopsia for colour. In both groups foveal colour discrimination, as stated by the 100 hue test, was also affected. Thus colour perimetry has to be added to standard perimetry for diagnosis of geniculo-striate lesions. - Guy Verriest.

Calibrating Maxwellian-view optical systems, by S.L. BUCK (Dept. of Psychol.,NI-25, Univ. of Washington, Seattle, Washington 98195, USA) and W. MAKOUS (Center for Vis. Sci., Univ. of Rochester, Rochester, NY 14627, USA), J. Opt. Soc. Am. 72, 960-962, 1982.

Either of two problems in calibrating Maxwellian-view optical systems can arise when troland value is calculated from measurements made by photometers requiring a visual match. Both problems lead to inaccurate estimates of light levels produced by the optical system. - The authors.

Identification of the R-G-cone difference signal in the corneal electroretinogram of the primate, by W.J. DONOVAN and W.S. BARON (Physiological Optics Program, SRI International, Menlo Park, California 94025, USA), J. Opt. Soc. Am. 72, 1014-1020, 1982.

The electroretinogram (ERG) can be used to evaluate retinal processes. Electrophysiologic studies of lower-order species indicate that important color-vision coding occurs in the outer plexiform layer. In the monkey, a color-opponet R-G cone difference signal has been reported in the intraretinally recorded foveal local ERG. We have searched for a similar signal in the corneal ERG. Steady-state ERG waveforms were elicited with long-wavelength, sinusoidally flickering stimuli that subtended either 45 or 17°. Waveform analyses reveal two primary components that are differentially affected by changes in illuminance, temporal frequency, and chromatic adaptation. Similarities between the foveal local ERG and corneal ERG data with regard to amplitude and phase indicate that one of these corneal ERG components is the R-G-cone difference signal. Our findings raise the possibility that the integrity of the outer plexiform layer can be monitored by means of the corneally recorded ERG and that distal-retinal color-coding phenomens can be studied in man. - The Authors.

Chromatic adaptation and flicker-frequency effects on primate R-G-cone difference signal, by W.S. BARON (Physiological Optics Program, SRI International, 333 Ravenswood Avenue, Menlo Park, California 94025, USA), J. Opt. Soc. Am. 72, 1008-1013, 1982.

I recently reported on a negative component in the foveal local electroretinogram (LERG) of the primate that is dependent on the sensitivity differences between the R and G cones. This R-G-cone difference signal is most readily resolved in the foveal LERG in response to low-frequency sinusoidally flickering stimuli. In this paper, I report on changes in the R-G-cone difference signal (elicited with a 670-nm test stimulus) that are induced by 670- and 470-nm chromatic adaptation and flicker frequency. Both long- and short-wavelength backgrounds reduce the cone difference signal but the long-wavelength reduction is associated with a phase shift that is absent with short-wavelength adaptation. Following extinction of the long-wavelength background, the R-G-cone difference signal is initially absent and increases in amplitude and phase for 5 min. In contrast, following extinction of a short-wavelength background that is about equally effective on the R cones, the cone difference signal is always present and at full amplitude. The R-G-cone difference signal has a low-pass frequency response that falls off at a higher frequency and more abruptly than the accompanying positive component. - The Author.

Exchange threshold colorimeter and analytical anomaloscope of class I and class II subjects and colour defectives, by R. COBB (Department of Psychology, Adam Smith Bldg, Glasgow, G12 8RT, Scotland), Perceptual and Motor Skills 53, 523-544, 1981.

The spectral absorption curve of "red" cones erythrolabe and the "green" cones chlorolabe are examined by these techniques. Evidence is elicited for a fourth photopic response peaking ar approximately 570 nm. - The Author.

Homogeneity of large field colour matches in congenital red-green colour deficients, by A.L. NAGY (Centre for Human Information Processing, University of California, San Diego La Jolla, California 92093, USA), J. Opt. Soc. Am. 72, 571-577, 1982.

The large individual differences in the Rayleigh match for deutans and protans typically noted with 2° fields were reduced using a large field Maxwellian view system involving circular annuli (inner diameter 4°, outer 12°). Under conditions of dark adaptation with and without a 20° 455 nm background superimposed to desensitize rods at appropriate luminance levels. Results were less variable for severe defectives using the former non-conventional arrangement, although large individual differences between the matches of observers within the protan and deutan groups were maintained. With the blue background the match-range midpoints for anomalous subjects varied no more than those of normal observers although their match-range sizes showed greater variability

than normals. Nagy argues against pigment variation as the sole cause of such variability. A theory that suggests the differences can be related to the relative number of abnormal cones present in each retina is outlined. - Janet Voke.

Field sensitivity of the short-wavelength-sensitive mechanism in the protanope's parafoveal retina, by R.S.L. YOUNG (University of Illinois Eye and Ear Infirmary, 1855 West Taylor Street, Chicago, Ill. 60612, USA), J. Opt. Soc. Am. 72, 1026-1028, 1982.

The parafoveal short-wavelength-sensitivity mechanism in a protanopic patient with retinitis pigmentosa was found to lack the secondary (long-wavelength) field-sensitivity mode, a property that is characteristic of Stiles's pi 1 mechanism. The results document that normal protanopic observers also lack this mode and reject the hypothesis that the present measurements reflect a pi 3-like-rather than the pi 1-like-mechanism.- The Author.

Characteristics of genetic carriers of congenital color vision defects, (3) Spatial summation function of proto-carriers, by T. YASUMA, H. ICHIKAWA and K. ICHIKAWA (Dept. of Ophthalmol., Nagoya University School of Medicine, Japan), Acta Soc. Ophthalmol. Jpn. 85, 306-309, 1981.

The spatial summation function of the flicker detecting properties of each conducting system related to red or green cone pigment was sought in 10 proto-carriers. Although the spatial summation function of the green cone system revealed similar properties to that of normal males, the spatial summation function of the red cone system revealed abnormal properties; that is, the flicker-detecting ability of the red cone system of proto-carriers represented a marked decline as the field became smaller. These results suggest that the functional abnormalities lie in the inner plexiform layer of the retina in the genetic carriers of congenital protan defects. - Yasuo Ohta.

Characteristics of genetic carriers of congenital color vision defects, (4) Detection of carriers, by T. YASUMA, H. ICHIKAWA, K. ICHIKAWA and S. TANABE (Dept. of Ophthalmol., Nagoya Univ. School of Med., Japan), Acta Soc. Ophthalmol. Jpn. 85, 381-384, 1981.

M. Ikeda et al. developed a new flicker method to detect color defectives. This flicker method, based on the heterochromatic threshold reduction factor (HTRF) of Boynton, was applied to carriers of congenital color vision defects. This method was very useful for carriers besides for color defectives. Especially deutero-carriers, who were previously difficult to be detected, could be sufficiently discriminated from normals. - Yasuo Ohta.

Frequency of colour vision defects among Zulus in Natal, by R.W. PICKFIRD and R. PICKFORD (University of Glasgow, Scotland), J. Biosoc. Sci. 13, 241-248, 1981.

The HRR test was used to study the frequency of colour vision defects in 297 Zulu men and 43 Zulu women of Natal, two Basuto men in Natal, and two Swazi men and 21 Swazi women in the Transvaal. The frequencies agree with the work of other authors, that the numbers of red-green defectives in the black populations of Africa are less than half those among European whites. The observed frequency of women defectives is greater than that expected from the number of males, and the difference is probably due largely to the inclusion of a small number of women with considerable heterozygous manifestation. No yellow-blue deficient subjects were found. - The Authors.

A case of rod monochromat(ism), by O. OKAJIMA, T. TANINO and M. OKAMOTO (Dept. Ophthal., Fac. Med., Tokyo University, Japan), Folia ophthalmol. jap. 31, 224-230, 1980.

A 14-year-old boy with amblyopia, nystagmus and photophobia was diagnosed as a case of typical rod monochromatism through colour vision tests, measurement of the spectral luminosity and ERG recording. His parents were first cousins, and his 11-year-old brother showed a similar condition.

The Sloan achromatopsia test was carried out, and the results were compared with the spectral luminosity curve : this method was useful for a qualitative evaluation of the spectral luminosity curve of the patient.

The dark adaptation curve was determined using a white stimulus light with a diameter of 10°, after light adaptation under conditions in which full-bleach of the visual pigments is expected. His dark adaptation curve was monophasic with a time constant of 7 minutes. The final threshold was 4.1 log unit which was within normal limits. The curve showed a rapid drop in threshold and this corresponded to the rod adaptation curve of the normal eye following partial bleach of the visual pigments. The partial bleach of the rod was attributed to intensive photophobia which did not allow opening of the eye during preadaptation. - Yasuo Ohta.

A case of incomplete achromatopsia of the deutan type, by D. VAN NORREN and E.D. DE VRIES-DE MOL (Institute for Perception, Kampweg 5, 3769 DE Soesterberg, The Netherlands), Docum. Ophthalmol. 51, 365-372, 1981.

A 45 year old man was studied who was previously diagnosed as a typical achromat. Increment spectral sensitivity measurements on white and several colored backgrounds showed that he possessed a rod system, a cone system sensitive in the short wavelength region (blue cones) and a cone system sensitive in the long wavelength region (red cones) This investigation shows that rather extensive testing is required to classify incomplete achromats. - The Authors.

Complete and incomplete congenital achromatopsia in one sibship, by W. JAEGER and H. KRASTEL (Univ. Eye Hospital, Bergheimer Str. 20, D-6900 Heidelberg, FRG), in A. HUBER and D. KLEIN (eds.), Neurogenetics and Neuro-Ophthalmology, Elsevier/North-Holland Biomedical Press, Amsterdam, 1981, pp. 241-245.

The typical achromat and the incomplete achromat of the danish T. family described by Franceschetti et al. (Acta XVIII. Conc. Ophthalmol. Int. 2, 1182, 1959) were completely reexamined in Heidelberg. The original diagnosis was confirmed. The threshold spectral sensitivity curve is scotopic in the typical achromat but presents a secondary maximum peaking at 600 nm in the incomplete achromat. - Guy Verriest.

Statistical demonstration of minor colour vision abnormalities, by G. VERRIEST, F. HAUREZ and P. PIERART (Dept. Ophthalmol., Univ. of Ghent,& Dept. Biology, Univ. of Mons), International Ophthalmology 5, 43-54, 1982.

Analysis of the results from 94 male and 94 female young normal trichromats on the 100 hue test and the Nagel and Pickford-Nicolson anomaloscopes shows that colour deviant and/or colour weak subjects can be distinguished from the wholly normal bulk bu considering the normality of certain test results distributions as well as by considering the combinations between test results considered abnormal. The stated minor abnormalities of colour vision are frequent and their types are those described by Pickford and by Lakowski (never colour asthenopia). They are recognised by means of the anomaloscopes and not by means of the 100 hue test. - The Authors.

Essential night blindness with cone monochromasy, by A.J.L.G. PINCKERS, J. POKORNY, V.C. SMITH and D. VAN NORREN (Dept. of Ophthalmol., Catholic Univ. of Nijmegen, The Netherlands; Eye Research Lab., University of Chicago, 939 East 57th Street, Chicago, Ill. 60637, USA; Institute for Perception TNO, Soesterber , The Netherlands), v. Graefe's Arch. Clin. Exp. Ophthalmol. 218, 322-326, 1982.

A young patient with reduced vision complained of night blindness and color blindness. Clinical examination data and retinal densitometry were consistent with essential night blindness. Spectral sensitivity and color vision testing revealed cone monochromasy. - The Authors.

Macular color vision defects : Specialized psychophysical testing in acquired and hereditary chorioretinal diseases, by J. POKORNY, V.C. SMITH and J.T. ERNEST. In International Ophthalmology Clinics, Electrophysiology and Psychophysics : Their use in ophthalmic diagnosis. vol. 20, No 1, pp. 53-81, 1980. Publ. Little, Brown and Co., Boston (Mass.). 1980.

The authors describe the results of special psychophysical tests (assessment of the area effect and of the change of the wavelength of the comparison field on the Rayleigh match,

assessment of the Stiles-Crawford effect) in normal subjects, in acquired chorioretinal diseases (central serous choroidopathy, acute posterior multifocal placoid pigment epitheliopathy, fibrovascular scar, multifocal choroiditis) and in hereditary chorioretinal diseases (choroideremia, fundus flavimaculatus, familial drusen, vitelloruptive macular dystrophy). The findings explain very clearly the mechanisms of the macular color vision defect. - Guy Verriest.

On spectral sensitivity test of the retinal receptor in the central serous chorioretinopathy, by Y. OHTA, A. SEKI and T. MIYAMOTO (Dept. of Ophthalmol., Tokyo Med. College, Tokyo, Japan), Jap. J. Clinic. Ophthalmol. 35, 643-648, 1981.

We conducted a series of tests in central serous chorioretinopathy because we check the function of the retinal receptors in various fundus diseases by measuring spectral sensitivity. We use a Maxwellian view system with 2 light paths : the test light is monochromatic radiation coming from a monochromator, while the background illumination is composed of 3 different lights from 3 different filters (yellow, blue and purple). A 500 W Xenon lamp is used as light source. The visual angle of the test light is 1°, while the angle of the background is 5°. The subjects were 12 patients for 12 eyes with central serous chorioretinopathy. Decrease of blue cone sensitivity is marked already in the early stage. Decrease of red-green sensitivity is less obvious. In the initial stage of the disorder, the sensitivity defect parallels the results of 100-hue test, but as the symptoms became milder the blue sensitivity defect is solely observed. When the lesion of the fovea centralis is mild, only blue sensitivity is affected; but when the lesion of the fovea centralis is severe RG sensitivity is also affected.--- Yasuo Ohta.

Colour vision change after panretinal photocoagulation (Evolution de la vision des couleurs après photocoagulation panrétinienne), by P. LANTHONY (15 bis, boulevard du 14 juillet, F-10000 TROYES, France), Bull. Mém. Soc. Fr. Ophtalmol., 91-93, 1981.

The study includes 80 patients with diabetic retinopathy treated by panretinal photocoagulation. A first part concerns possible early effects colour vision being examined 1, 24, 48 hours and 100days after treatment. The second part concerns possible late effects from 3 months up to 5 years.

Colour vision was examined by means of pseudo-isochromatic plates (AO HHR, Ishihara, Velhagen), standard and desaturated Panel, City University Colour Vision Test, 40 Hue Test, New Color Test, Hemmendinger and Davidson colour rule.

In 6 cases of the first group colour vision was normal before the treatment and remained normal. In the second group two kinds of defects have to be considered : (a) in 27 patients an acquired defect was found already before the treatment only by means of the Ishihara plates and remained unchanged; (b) in 48 patients an acquired blue-yellow defect did not change after laser treatment.

With this method nothing can be said about an impairment of colour vision by laser exposure or about an improvement of the retinopathy after photocoagulation. No correlation was found between the loss of visual acuity and the severity of the colour vision defect. - Jean Vola.

Treatment by zinc sulfate of toxic and metabolic optic neuropathies (Traitement par le sulfate de zinc des neuropathies optiques toxiques et nutritionnelles), by A. BECHETOILLE and J.M. EBRAN, Bull. Mém. Soc. Fr. Ophtalmol., 231-236, 1981.

Among other investigations, colour vision of 8 patients with optic neuropathy was examined by means of a computerized 100 hue test. After treatment with zinc glucomate (40 mg/day) a consistent improvement of the index score was observed. - Jean Vola.

OBITUARY

Louise L. Sloan, Ph. D,
member of honor of the IRGCVD
May 31, 1898 - March 1, 1982

Louise L. Sloan, known affectionately by her school-girl nickname of "Sloanie", was personnally and professionally known and respected by vision scientists and clinicians throughout the world. Her multifaceted career, spanning nearly 50 years at the Wilmer Institute of the Johns Hopkins University, pioneered and shaped the now-maturing subdiscipline of clinical vision research. I first met Louise Sloan in 1973 at the Second Symposium of the International Research Group on Colour Vision Deficiencies in Edinburgh; I was a graduate student and she was about to enter her "second retirement" after directing the Wilmer Laboratory of Physiological Optics for 44 years. I regret that I could not have known her during her most active years, but I have been fortunate to be at the Wilmer and benefit from her guidance during her final years. Many important evenings were spent in Sloanie's kitchen engaged in animated and enthusiastic discussion, catalyzed by her favorite liqueurs, experiences for which I am grateful and richer.

Louise Sloan was born on May 31, 1898, in Baltimore. She attended Bryn Mawr School in Baltimore, an outstanding girls' school, receiving their distinguished alumna award in 1971. It was here that she gained her nickname of "Sloanie". She graduated from that school in 1916, winning a scholarship for distinguished work in mathematics. The next year Sloan entered Bryn Mawr College, in Pennsylvania, where she earned her Bachelors and a Ph. D. in experimental psychology. Her work at that time with Clarence Ferree and Gertrude Rand based her career solidly in ophthalmic research. Following a short time at Harvard University, she began her work at the Wilmer Institute in 1929, destined to add greatly to the productivity of the Wilmer Institute for the next 50 years.

In a 12-month period from August 1939 to August 1940, Sloan published a four-part treatise in the Archives of Ophthalmology in which she carefully analyzed the problems of clinical perimetry and introduced new methods that we now call static perimetry. In the third paper of that series, Sloan described a new apparatus for measuring perimetric photopic and scotopic thresholds, she presented the first perimetric threshold measures on the normal eye, and she reported perimetric threshold measures on a variety of patients.

In 1942, Sloan described an exhaustive study employing her static perimetric techniques to characterize retinal regional variations in vision loss in retinitis pigmentosa; this study still stands as an important contribution to our understanding of that enigmatic disorder. A quality of this study that epitomizes Sloan's work in general was the genuine interest in solving a clinical problem. Although Sloan developed and used state-of-the-art psychophysics, her emphasis was on the pathophysiology per se.

For most of her tenure at the Wilmer Institute, Sloan directed the Laboratory of Physiological Optics. The Laboratory Physiological Optics was, and still is the foundation of the Wilmer Institute, owing to its privileged location in the Wilmer basement. The Wilmer basement has always housed quite a menagerie; its reputation is best summarized in this passage from a book about the history of the Wilmer Institute by Randolph and Welch:

"It was amusing that whenever a strange-looking person, one with a beard, without necktie, with a foreign accent or other peculiarity, got 'lost' in Wilmer, he was directed down to the basement -- where he apparently belonged or ought to belong."

Part of this reputation could be attributed to the esoteric activities conducted in the Wilmer basement, however, part of the reputation no doubt was well-deserved.

During World War II, the Air Force persuaded Sloan to take a leave of absence and to work for a period at the School of Aviation Medicine at Randolph Field in San Antonio. At first Sloan refused to go unless the Air Force also provided a position for her husband and frequent collaborator, Dr. William Rowland. The Air Force agreed, but in its characteristic way added the stipulation that the two of them would not be permitted to live together. In response, Sloan declared that if the Air Force would not allow her and her husband to live together as a married couple, they then would live together in sin.

During the war years at Randolph Field, Sloan turned her energies to color vision and color vision testing. She developed and perfected the Sloan color vision test used by the Air Force and Farnsworth Lantern Test used by the Navy. Her work during this period established her as a respected color vision authority. Upon returning to the Wilmer Institute, she again focused on problems of vision in the periphery and the assessment of visual function loss in clinical disorders. She also built upon her color vision work by concentrating on evaluation of acquired color vision disorders. Some noteworthy contributions include a study of 19 cases of congenital

achromatopsia, studies of progressive cone degeneration and her work on elucidating the incomplete achromatopsias. She developed a special test for achromatopsia and modified several other color vision tests in order to improve their performance in the clinical setting.

In a 1958 paper, published in the American Journal of Ophthalmology, Sloan described some curious properties of congenital rod monochromats, observations that are still provocative. The popular belief had been that rod monochromats have only the normal rod photoreceptor. Sloan presented arguments from the literature that the rod monochromat must also have photopic receptors, the question was, what kind of photopic receptors? Using scotopically matched blue and white stimuli, Sloan observed a classic rod-cone break in the dark adaptation curve of the rod monochromat. However, unlike the normal observer, the thresholds for the blue and white stimuli were the same on the cone branch. Sloan argued that data such as these, collected on four monochromats, indicated that the rod monochromat has a photopic system, but it is rhodopsin based.

One of Sloan's pet peeves was the clinical assessment of visual acuity. There was a plethora of tests, using a wide variety of optotypes, luminance levels, contrasts, and test distances. In 1953, the American Medical Association created a committee on Optics and Visual Physiology. A subcommittee on optotypes, which consisted of Gerald Fonda, James Lebensohn, Kenneth Ogle, and Louise Sloan, was charged with the responsibility of recommending standards for visual acuity charts. In 1959, Sloan published a paper in the American Journal of Ophthalmology that described new acuity charts, employing what are now known as Sloan letters. These charts not only met the standards of that 1953 subcommittee that is : designation of visual acuity in terms of visual angle of resolution, and geometric progression of letter size; but also they met the dicta of two earlier A.M.A. subcommittees, one in 1916 and one in 1930, both of which required letters be of known difficulty in comparison to Landolt rings. The Sloan letters are based on a logarithmic progression in angular subtense with about .1 log unit change per line. For near acuity, Sloan designed a chart using the M notation, which corrects for testing distance. For both charts, the letters were carefully chosen to be equally difficult. This paper was the culmination of several years of work, much of which was described in three earlier publications. Sloan's work on visual acuity testing stands as a major contribution to an important aspect of clinical evaluation. The Sloan letters have become standard and are employed in many ongoing clinical trial studies.

Sloan's work put her in the position where she was attempting to change the status quo in visual acuity testing, visual perimetry, and color vision testing. She served on national and international committees that recommended standards in all three areas. As you might imagine, telling practice physicians that the way they have been doing things is wrong and must be improved does not always elicit the

response of endearment and affection. Thus, we would be remiss not to mention her determination and efforts to improve and standardize clinical psychophysical testing. Although she succeeded in tweaking a few noses and raising the hair on some backs, she maintained the respect and admiration of the ophthalmologic community.

Sloan's clinical collaborations at the Wilmer spanned a broad spectrum of interests and illustrious individuals such as Jonas Friedenwald, Frank Walsh, and Alan Woods, to name but a few. Although Sloan's scientific contributions are wall-known, she probably will be best remembered for her contributions to the clinical application of basic optics for all those patients with low vision, patients who are beyond all other ophthalmological help. Interestingly, much of her low vision work was carried-out after her "first retirement" in 1963.

The many contributions of Louise Sloan have been widely recognized. Sloan was awarded the prestigious Edgar D. Tillyer medal by the Optical Society of America in 1971, and she was the recipient of the first Lighthouse Pisart Vision Award in 1981. As a recent tribute to her inspiration, a scientific meeting was dedicated to her as an update of the clinical psychophysics to which she had been so devoted. It was no surprise to see the number of her disciples at that meeting and the tremendous influence of her work that engendered a meeting requiring three days for completion.

For 50 years, Louise Littig Sloan graced the Wilmer Institute with charm, wit, and wisdom; she will be greatly missed and fondly remembered by all those who had the good fortune to know her. Her legacy to vision and ophthalmic research will live on.

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