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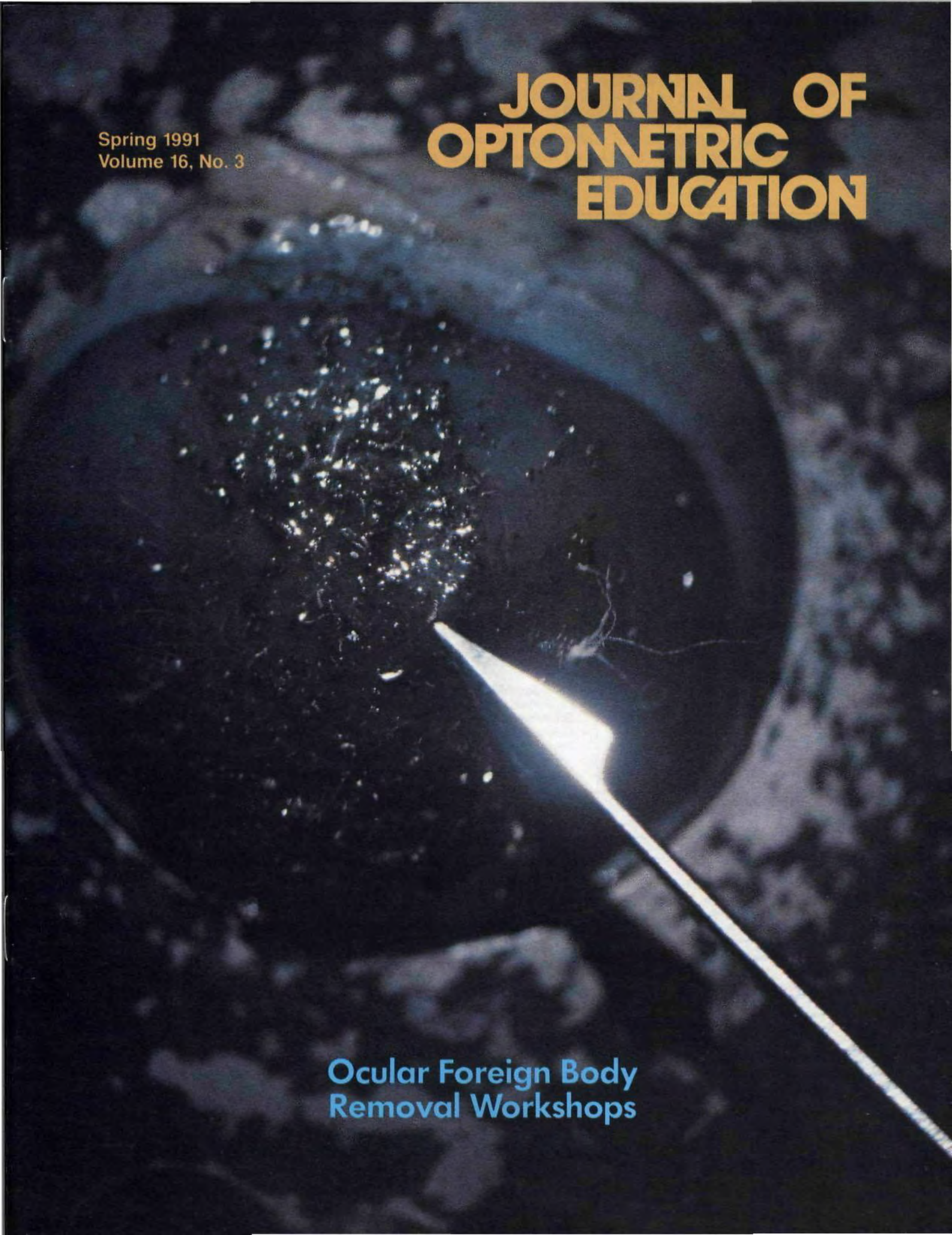

Ocular Foreign Body Removal Workshops

Association of Schools and Colleges of Optometry

The Association of Schools and Colleges of Optometry (ASCO) represents the professional programs of optometric education in the United States, Canada and a number of foreign countries. ASCO is a non-profit, tax-exempt professional educational association with national headquarters in Rockville, MD.

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Cover photo shows a practitioner's view of a calf's eye while utilizing double edge lancet spud, in the removal of an ocular foreign body. (See article on page 77) Photo by Cliff Scott, O.D.

The **JOURNAL OF OPTOMETRIC EDUCATION** is published by the Association of Schools and Colleges of Optometry (ASCO). **Managing Editor:** Patricia Coe O'Rourke. **Art Director:** Dan Hildt, Graphics in General. Business and editorial offices are located at 6110 Executive Boulevard, Suite 514, Rockville, MD 20852 (301) 231-5944. **Subscriptions: JOE** is published quarterly and distributed at no charge to dues-paying members of ASCO. Individual subscriptions are available at $15.00 per year, $20.00 per year to foreign subscribers. Postage paid for a non-profit, tax-exempt organization at Rockville, MD. Advertising rates are available upon request. *The Journal of Optometric Education* disclaims responsibility for opinions expressed by the authors. Article copies, 16mm microfilm, 35mm microfilm and 105mm microfiche are available through University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan 48106.

Let's Practice What We Preach

Catherine Hines, O.D.

Previous editorials appearing on these pages have challenged us to "[modify] our teaching methods to increase the emphasis on the cognitive process," or reminded us that "teaching innovation must reflect the life-long learning principles" that are "critical characteristics of professionalism," and admonished us "to commit time to develop an understanding of the discipline of cognitive science."

Many of us in optometric education have taken these urgings to heart, and incorporated these principles into our teaching. I recently began teaching an ocular disease course using a problem-based learning approach, and I'm aware of similar courses that have been implemented or planned at many other optometry colleges. Numerous examples of colleagues' efforts in this area can be found by leafing through back issues of JOE: a review of problem-based learning in medical education; descriptions of patient simulation tools such as patient management problems, portable patient problem packs, and patient assessment diagrams; instructional strategies to help instructors break away from traditional teaching methods; and an entire issue of the journal devoted to "Teaching Clinical Reasoning."

A significant coup for problem-based learning was last year's debut of patient management problems (PMP's) as the basis for Part 3 of the National Board of Examiners in Optometry (NBEO) examination. Traditional objective tests (multiple choice, true or false, or fill-in questions) tend to test a student's ability to recall memorized facts, rather than the ability to solve a problem. Studies have shown that medical students in problem-based learning tracks did poorly on multiple-choice board examinations compared to fellow students who learned the material in a traditional format. Educators who use problem-based learning must therefore create innovative testing techniques which accurately assess those cognitive skills we are striving to teach. This is a difficult task, possibly the most challenging part of problem-based learning. The NBEO spent years developing the PMP method of evaluation, and their efforts certainly deserve applause. In addition, by involving faculty throughout the development process, the NBEO was responsible for much of the early motivation to introduce PBL into the curriculum.

So it looks like an educational revolution is in progress, right? Walk into a curriculum committee meeting at any optometry college and there will be animated discussion about revamping the curriculum to include problem-based learning, right? Wrong!

These days, all curriculum discussions focus on the recent decision of the NBEO to increase the emphasis on basic biomedical sciences and ASCO's recommendations for changes in the biomedical curriculum. Both of these recommendations are firmly rooted in traditional teaching methodologies: the new National Board content outline translates into an increase in the number of multiple choice test questions, while ASCO's recommendations are reported in terms of lecture and laboratory hours. Optometry schools feel pressured to add additional course hours to an overcrowded curriculum to insure that their students are provided with all the facts necessary to pass the NBEO examination. While neither NBEO nor ASCO is dictating how this material should be taught (in fact, the ASCO report recommends a greater emphasis on alternative teaching methods), the emphasis in institutional faculty discussions is clearly on course content and passive learning techniques.

How colleges choose to respond to these recommendations could prove to be a critical turning point in optometric education. We can take ASCO's recommendations literally and continue adding lectures and laboratories until we reach the suggested 455 hours. We can continue testing our students via traditional multiple choice tests, and feel justified because we're preparing them for the National Boards. Or we can use these recommendations as the impetus for implementing not only curriculum changes, but changes in our teaching and testing methodology. ASCO and the NBEO could provide leadership in this direction by organizing workshops to develop faculty skills in problem-based learning, similar to the faculty seminars they sponsored during the development of the PMP boards. Let's practice what we preach and take this opportunity to reorganize optometric education to "increase the emphasis on the cognitive process" and "reflect . . . life-long learning principles."

Dr. Hines is an assistant professor at the New England College of Optometry and a member of JOE's Editorial Review Board.

NEW

Volk Area Centralis®, TransEquator® and QuadrAspheric® Fundus Laser Lenses

Presenting the most technically advanced Fundus Laser Contact Lenses yet! The new Volk Area Centralis® and TransEquator® lenses join the popular QuadrAspheric® lens to provide the diagnostic and therapeutic choices you need.

All three lenses are available with Volk's new AR/DI® Laser Coating for both argon and diode laser,* or standard SupraCoat multi-layer AR Coating.

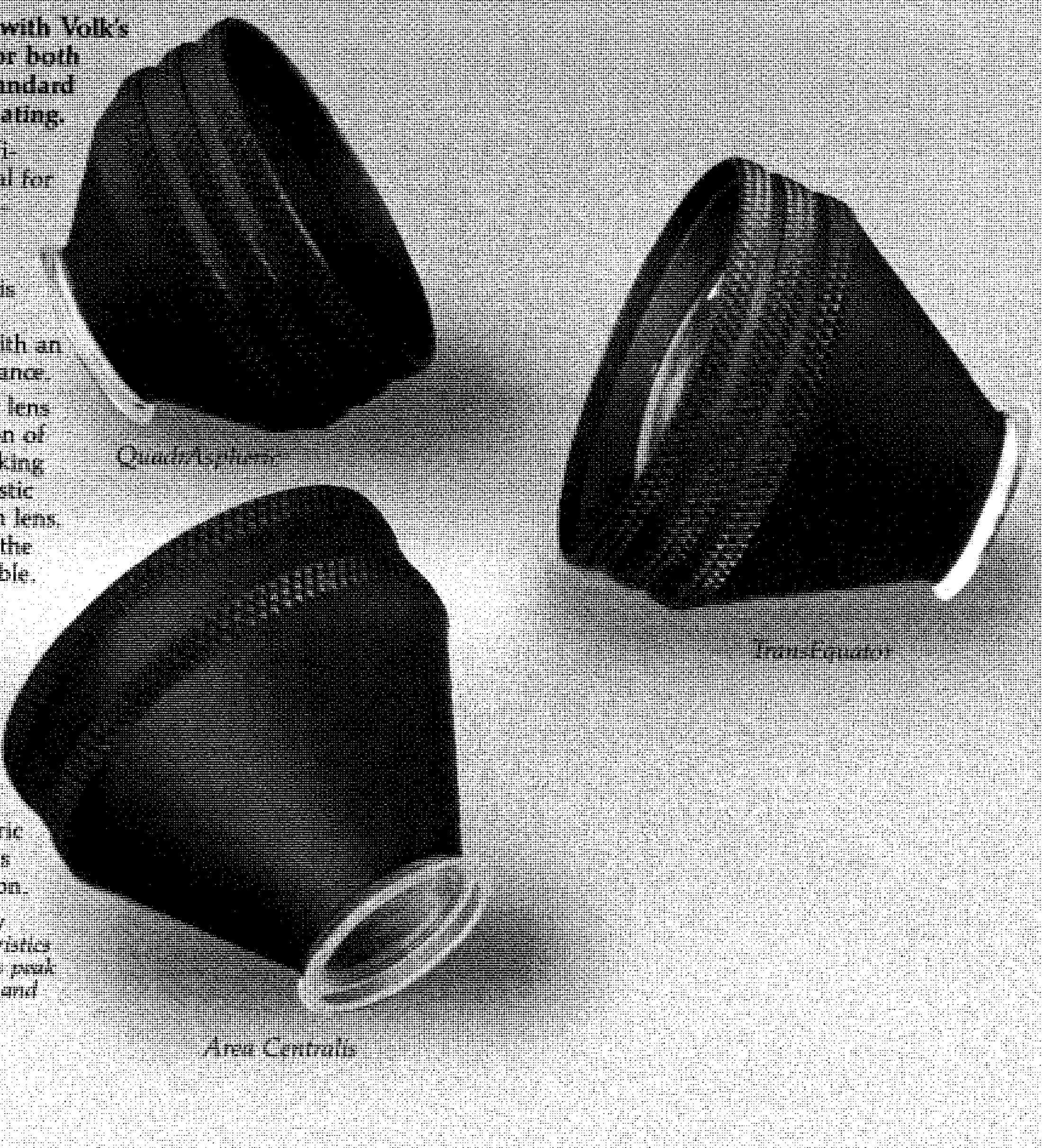
Area Centralis: The high magnification Area Centralis lens is ideal for detailed disc and macular examinations and laser therapy in the central retinal area. An unusual equator to equator fundus view is obtainable with this high 1.0 magnification laser lens along with an improved slit lamp working distance.

TransEquator: The TransEquator lens provides an excellent combination of both field and magnification making it an outstanding general diagnostic and pan retinal photocoagulation lens. Fundus views up to and beyond the equator are immediately obtainable.

QuadrAspheric: Providing the widest 130° field of view, the high power, lower magnification QuadrAspheric lens presents a single view including both the macular and peripheral retinal regions. An excellent lens for pan retinal photocoagulation and vitrectomy, the QuadrAspheric distinguishes itself as an ideal lens for smaller pupil fundus examination.

**Volk AR/DI Laser Coating uniquely provides high anti-reflective characteristics within the visible spectrum as well as peak performance for argon (488/512 nm) and infrared diode (810 nm) lasers.*

Patent Pending



VOLK

The Leader in Aspheric Optics

Made in the United States of America

BOSTON® ENVISION™ Lens Expected to Stimulate RGP Market

Polymer Technology Corporation announced the availability of BOSTON ENVISION, which combines a unique, junctionless back surface design with a state-of-the-art, fluorinated material. The product of over five years of research and development, BOSTON ENVISION is available from authorized BOSTON manufacturers.

"The introduction of ENVISION represents our most important breakthrough to date because it offers specific solutions to the biggest barriers facing widespread acceptance of rigid gas permeable contact lenses," stated Colleen Janick, marketing manager. "ENVISION's design allows for a more consistent and efficient fit than previous generations of RGPs, while providing significant benefits to patients."

The fitting performance of BOSTON ENVISION is optimized by the highly durable BOSTON RXD® material. As a result of its low silicone/high fluorine ratio, it offers a superior combination of increased oxygen transmissibility, wettability and deposit resistance for better maintenance of corneal health in daily wear.

In accordance with Polymer's clinical engineering philosophy, extensive studies were performed to demonstrate ENVISION's excellent cliical performance. Results of one study, awaiting publication, involved 127 practitioners and 634 patients—making it one of the largest RGP studies ever conducted.

"Our research confirmed that we have achieved our goal of developing a contact lens that helps maintain corneal health while providing streamlined fitting, crisp visual acuity and enhanced patient comfort," concluded Dr. Keith Ames, director of technical services for Polymer. "These benefits make ENVISION an ideal lens for successfully fitting the astigmatic patient."

Corning Announces Two-Hour Chemtempering Process

An important new development from Corning, which dramatically reduces the time required for chemtempering Corning's current family of photochromic lenses, was presented at the annual meeting of the Optical Laboratories Association, held December 4-6, 1990 at the Las Vegas Hilton Hotel, Las Vegas, Nevada.

Mr. Reinard P. Krause, technical marketing manager, and Ms. Patricia Drake, product assurance engineer, Corning Incorporated, led a seminar in which they discussed this new process, *which requires only two hours from beginning to completion.* This is a far speedier alternative to the existing 16-hour chemtempering process, and will permit dispensers who use it to greatly increase their speed in filling prescriptions. The only glasses that can be treated via this process include PhotoGray Extra®, PhotoBrown Extra®, PhotoGray II®, and PhotoSun II®.

Ohio State University Receives Sunsoft Contribution

Dr. Rod Porter, director of professional services at Sunsoft, recently presented a check for $1,000.00 to the Ohio State University College of Optometry. Dr. Joe Barr and Dr. Richard Hill received the contribution to be used in the contact lens department at Ohio State University.

Bausch & Lomb Introduces Solutions System

Patients on a planned lens replacement program may soon leave their doctors' offices with several months worth of both lenses and care products, thanks to a new Bausch & Lomb program. Called Fresh Pak, the conveniently packaged system includes enough lens care products for the average daily wear patient to use for three months.

"We see the ever-increasing popularity of planned replacement programs like Fresh Lens and our new Medalist program as giving the practitioner a new opportunity," said Linda M. Coffey, Bausch & Lomb senior product manager. "That opportunity is to provide the patient everything he or she needs in one office visit. That will increase patient compliance, lessen confusion, cut down on lens drop outs and help practitioners retain their patients," she said.

The Fresh Pak consists of two 12 ounce bottles of ReNu multi-purpose solution, one 7 ml. bottle of ReNu rewetting drops and one 6 pack of ReNu effervescent enzyme, all packaged in one convenient box. The Fresh Pak will be available only through practitioners.

"With the Fresh Pak system, the doctor is virtually assured that his or her patients will stick to the care regimen prescribed with the lenses," said Coffey. "And since ReNu is approved as a disinfectant, daily cleaner and rinse, the system couldn't be simpler." For further information about Fresh Pak, contact your Bausch & Lomb representative or call 1-800-828-9030.

Bligh Joins Logo Paris

Kevin Bligh has joined Logo Paris as national sales manager, responsible for directing the Logo national sales force, including its regional and training managers.

Bligh's appointment is part of a larger effort to expand and strengthen Logo's sales management team, according to Fredric Grethel, vice president of marketing and sales.

Previously director of sales and marketing for CTL Inc., a contact lens division of Sola/Barnes-Hind, Bligh boasts an expertise in sales training, said Grethel. "We place a high priority on training and Kevin is charged with developing the best training program in the industry." Bligh will report directly to Grethel.

Bligh, 38, joined Sola/Barnes-Hind in 1982 and rapidly advanced through the sales and managing ranks.

Wesley-Jessen Announces Toric Parameter Expansion

The W-J DuraSoft® 3 OptiFit® toric is now available in an expanded parameter range. The 14.5mm diameter flexible wear lens is made from the durable 55% water content material phemfilcon A. Sphere powers now range from +4.00 to −8.00D in 0.25D increments. Cylinder powers now range from −0.75 to −2.25F in 0.50D increments while the axis range is 180° ± 20° and 90° ± 20° in 5° increments. W-J's Pertect Fit Guarantee applies to the DuraSoft® 3 OptiFit® toric whereby it may be returned for exchange or full credit within 90 days of initial purchase if the lens is unsatisfactory for any reason.

Wesley-Jessen also manufactures the DuraSoft® 2 OptiFit® (38% water content) toric for daily wear. Service levels for this line have been consistently excellent in recent months—98% of orders are shipped within 3 days and over 99% are shipped within 5 days. Backorders of the DuraSoft® 2 OptiFit® toric are virtually nonexistent.

Vistakon Grant to AOA Provides Free Eye Examinations for Low Income Workers

In making a grant to the American Optometric Association (AOA) to help raise awareness of eye health and support free eye examination for low income workers and their families, Vistakon president Bernard W. Walsh praised the organization for its admirable project.

"As a company involved in the vision correction business," said Walsh, "we are aware of the need for professional eye care and are happy to be part of the AOA's VISION USA Program."

VISION USA is a non-profit, tax exempt charity developed by members of the AOA to provide basic eye health and vision care services to those who have no other means of obtaining care.

At least 10 to 15 million low income workers are in need of eye care services but are not entitled to government benefits and cannot afford private insurance or the cost of ordinary treatment.

During Save Your Vision Week (March 3-9, 1991) those patients determined eligible will receive a comprehensive eye examination without cost where a participating optometrist, who is a member of the AOA, is available.

"The fact that 5,000 doctors across the country have signed up for the March VISION USA is an example of their getting involved to help others," Walsh said.

"In our daily business dealing with eye care professionals," he continued, "we see their true concern for the health of their patients. This worthwhile campaign to help those who cannot afford needed eye care demonstrates their commitment to the communities they serve.

FDA Approvals Give Practitioners Options with Paragon Lenses

Thanks to recent U.S. Food and Drug Administration (FDA) approvals, practitioners have even more flexibility in prescribing FluoroPerm contact lenses. The FDA recently approved FluoroPerm 60 lenses for one to seven days of extended wear, plus permitted Paragon to add an ultraviolet (UV) light absorber to FluoroPerm 30, 60 and 92 lenses.

"We continue to invest company resources in obtaining these approvals so that the practitioner choosing RGP lenses for the patient will have the broadest possible range of options within the FluoroPerm System," notes Paragon Optical vice president of marketing Krist Jani.

FluoroPerm 60, previously approved for daily wear, now may be prescribed for flexible or extended wear. With a higher Dk than FluoroPerm 30, FluoroPerm 60 is an excellent choice for patients who sleep in their lenses occasionally, or sleep in their lenses just a few nights at a time between removal for cleaning and disinfection.

"FluoroPerm 60 is a very stable, wettable, mid-Dk lens that fills the gap between daily wear and extended wear. It also is an excellent daily wear lens for patients who need a higher Dk than that provided by FluoroPerm 30," explains Bruce Bridgewater, O.D., director of clinical research for Paragon.

Practitioners who prescribe FluoroPerm lenses may also offer patients added UV protection with FluoroPerm's UV-absorber. This is particularly beneficial to patients who live in southern and southwestern climates, and those whose jobs or hobbies keep them in the sun for long hours. Practitioners are advised to also prescribe protective UV-absorbing goggles or sunglasses.

Sola Introduces Aspheric Single Vision Lens in Polycarbonate

Sola Optical introduced the ASL aspheric single vision lens in polycarbonate. The ASK aspheric in polycarbonate combines the cosmetics of a flatter lens design with the thin and light benefits of polycarbonate. Because of its sophisticated aspheric design, the ASL aspheric in polycarbonate is up to 10% thinner and lighter than ordinary polycarbonate, and up to 30% thinner and lighter than hard resin. And because the lens is flatter, the wearer's eyes look less magnified.

"By adding just the right amount of asphericity to the lens, we can flatten its front surface curve without sacrificing the optics in the periphery," says Mark Mattison-Shupnick, vice president of new products. "The result is the thinnest, lightest, best-looking polycarbonate on the market."

The new lens also blocks UV light up to 380nm, and is significantly more impact-resistant than hard resin. Even when anti-reflective coated, it is impact resistant at 1.5mm center thickness.

The ASL aspheric lens in polycarbonate is produced through a patented polycarbonate manufacturing process. In addition, it has a patented front surface coating that survives the darkest tints. The ASL aspheric in polycarbonate is available in an 80mm diameter for prescriptions ranging from -10.00 to +4.00.

CIBA Vision™ Corporation Announces Executive Changes

James M. Callahan, CIBA Vision™ Corporation president and chief executive officer, announced executive changes within the corporate organization.

"Looking at the opportunities and challenges ahead for CIBA Vision as both a U.S. and a worldwide leader in the provision of vision care products and services, it became clear that we needed to respond to the changing market and expand our horizon for long-term growth," Callahan said. "December 1990 closed as a record high month and year for CIBA Vision Corporation; we plan to continue that success into 1991."

Callahan named Terry Walts as senior vice president, strategic market development. Walts will be responsible for new product development, strategic planning and overall business development. Previously, Walts served as senior vice president of sales and marketing.

Callahan promoted Stuart Heap to senior vice president, sales and marketing, overseeing both soft contact lens and lens care product groups. Previously, he served as vice president, sales and marketing, professional products group.

In continuing to strengthen CIBA Vision's commitment to research and development, Callahan appointed Gary T. Lafferty as vice president, technical affairs. Prior to joining CIBA Vision, Lafferty served as president and chief operating officer or Unilens Optical Corporation.

Callahan also named Joe DeLapp to vice president, sales and marketing, professional products group. DeLapp most recently served as vice president, new products group for CIBA Vision. DeLapp has 14 years marketing experience and prior to joining CIBA Vision, he served as director of marketing, oral care division of Johnson & Johnson.

Vistakon Expands Product Marketing Staff

The appointment of Philip K. Fitzsimmons Jr. and Lori Nolan Wishard as product managers of Vistakon, Inc., was announced by Philip R. Keefer, executive vice president for marketing.

"As our business continues to enjoy vigorous growth, the addition of these two experienced marketing professionals will enable us to continue our leadership role in developing innovative marketing programs designed to help our ACUVUE® customers build their contact lens businesses," Keefer said.

Mr. Fitzsimmons will be responsible for national accounts marketing and will concentrate on supporting our retail and national distributor network businesses. Ms. Wishard will be focusing on professional marketing programs designed to continue our ongoing support of the professional eyecare practitioner, he said.

Sola Names New Director of Lens Consultants

Sola has selected Silvio Coccia as its new director of lens consultants.

Coccia was formerly western regional director of the Specialty Sales Division of Ciba-Geigy Corporation. He has extensive experience managing regional sales operations and building and directing sales forces. As director of lens consultants, he will be responsible for managing Sola's national lens consultants organization.

Valerie Manso, former director of lens consultants, was recently named director, national accounts. In her new position, she is responsible for initiating Sola activities with major accounts as well as for coordinating Sola's involvement with national trade shows.

Both Silvio Coccia and Valerie Manso will report to John Potocny, vice president, account management. "Silvio adds a great deal of management strength and ability to the lens consultant organization, as well as to the whole account management team," says Potocny.

W-J Announces Prosthetic Lens Program; All Profits to Go to Vision Education

Patients with injured, diseased or otherwise disfigured eyes are the target of a special Wesley-Jessen program, all profits from which will be donated by W-J to vision education.

Unveiled in January, W-J's Prosthetic Lens Program is designed to make DuraSoft® Colors prosthetic lenses available to more practitioners and their patients.

To do just that, W-J is offering to make any custom prosthetic soft contact lens required, within stated parameters. All profits from the sale of the lenses will be donated to one of the following organizations, as designated by the practitioners when ordering the lens(es): the Contact Lens Association of Ophthalmologists (CLAO), the Contact Lens Section of the American Optometric Association (AOA-CLS), and the Contact Lens Society of America (CLSA).

According to W-J's Director of Professional Services, Dr. Dwight H. Akerman, this program allows all contact lens practitioners, through treatment themselves or referral, "to make a big difference in the life of someone with special eyecare needs by providing them a lens that gives the most natural appearance."

He aded: "W-J is proud to help patients with injured or diseased eyes enjoy natural ocular appearance. We are also pleased to donate all profits from the sales of our prosthetic lenses to organizations dedicated to vision care education."

All lens orders will be customized, requiring 6 to 10 weeks for delivery. The price will be $150 per lens.

Orders and information requests will be taken through a newly-established toll-free telephone number for W-J's Prosthetic Lens Service, 1-800-488-6859.

In early 1991, CLAO, the AOA CLS and CLSA will be mailing to its members full details of the W-J Prosthetic Lens Program.

Varilux Names Ness New Vice President of Marketing

Varilux announced the appointment of Michael Ness as vice president of marketing. Michael's appointment is a significant step in an effort to intensify Varilux's marketing efforts and handle an expanding product line and market demand for Varilux Infinity® progressive addition lenses.

"Varilux is increasing its commitment to effectively and efficiently serve the independent eye care practitioner. The addition of Michael signifies a strong step toward fulfilling that commitment," said Mike Daley, president of Varilux.

Michael Ness joins Varilux from Arizona Instrument Corporation, Tempe, Arizona with two years as vice president of marketing and sales. Previously, Ness was with Sola/Barnes-Hind as director of marketing and Syntex as management of market development.

Varilux Infinity Brochure Aids in Fitting Presbyopes

"How do you decide who gets which progressive lens and when?" A new brochure from Varilux addresses the difficult questions of fitting presbyopes. In a question and answer format, Varilux addresses the changing needs of the presbyope and describes how the Varilux Infinity lens with multi-design technology meets those varying needs. In a clinical study ofpatients who had previously failed with progressives, 84 percent were successful with Varilux Infinity.

The four page, color brochure assists practitioners in answering patients' questions—and explains the benefits of a multi-design progressive as compared to a mono-design.

The brochure is available at no charge through Varilux. Please call 1-800-BEST-PAL, ext. 174.

Examination Standards for Licensure: The Reality of "75"

Leon J. Gross, Ph.D.

Abstract

Examinations used for licensure consist of several sections or stations. Many state boards require that each section or station be passed, either with a scaled or percentage score of 75. This study was conducted to evaluate the effect of multiple criteria on pass-fail rates. Data were taken from the April 1989 Basic Science and Clinical Science National Board examinations. The results indicate sharply elevated failure rates when multiple sections must be passed with scaled scores of 75. However, when 75% per section is required, nearly all candidates fail the examinations. These data suggest that multiple section criteria should not be utilized for licensure.

Licensure laws for optometry resemble the laws for other licensed health care professions. For each profession, state boards require that licensure examinations be passed. Although most state boards accept the written examinations of their profession's national board, state boards utilize the national board results in different ways. Some states require candidates to simply pass the overall examination Part; other states require that candidates pass the individual sections as well.

Generally, the specific licensure statute or corresponding rules determine whether the Part or section criteria are used. When section criteria are used, the statute typically references a pass-fail cutoff score of "75." Some state boards regard the 75 as a scaled score; others treat it as a percentage score. Either application of 75 elevates the failure rate significantly, although this increase is particularly pronounced by the use of percentage scores.

This effect is analogous to comparing simple and compound interest for a given amount of money. A simple rate of interest (e.g., 9%) may produce a lower yield for a given principle than would a lower rate of interest (e.g., 8.8%) that is compounded frequently. Similarly, the use of section criteria "compounds" the rate of failure, thus elevating the overall failure rate.

To illustrate the effects of using multiple section criteria, test data were analyzed from the National Board of Examiners in Optometry. The tests selected were the Basic Science and Clinical Science examinations from April 1989. The summary statistics for these examinations, and their component sections, are displayed in Table 1, as percentages and scaled scores. Based on Part cutoff scores of 61% in Basic Science and 63% in Clinical Science, the actual failure rates were 22% and 16%, respectively.

Standard Setting Methodology

Evaluating the effects of multiple criteria requires that the procedures for setting pass-fail cutoff scores be understood. The National Board establishes pass-fail standards using a modification of the Nedelsky technique. This is a criterion-referenced procedure; that is, the pass-fail score is predetermined and absolute. There is no curve, and candidates do not compete against each other to meet a passing quota. Theoretically, under criterion-referencing, all candidates may pass, or all may fail, based on their performance with regard to the pass-fail standard, not to each other.

Using the Nedelsky technique, the National Board examination committee members evaluate every *wrong* option (i.e., distractor) of each item. Distractors are classified as either "sophisticated" or "unsophisticated." Distractors are considered to be sophisticated if they are expected to be difficult to distinguish from the correct response by "minimally competent" candidates. In contrast, unsophisticated distractors should be readily eliminated (i.e., judged to be incorrect) by minimally competent candidates. Items containing few if any sophisticated distractors are considered to be easier than items with several sophisticated distractors.

The committee judgments yield a standard setting index for each test item. The raw score pass-fail cutoff is derived by summing each of the component item standard setting indices. This determination is similar to the calculation of par for a golf course. Rather than "ordaining" the course with an overall par, par is set for each individual hole, based on the perceived difficulty of the hole. Par for the course is computed by summing each of the hole pars.

In testing, an item is equivalent to a hole and has a standard setting index equivalent to par. However, this article focuses on the *use* of pass-fail cutoff scores, rather than their computation. Readers who desire a more complete description of the standard setting technique are referred to Gross.[1]

Pass-fail cutoff scores fluctuate in response to the varying difficulty levels of tests. Easier tests have higher standards; more difficult tests have lower standards. However, the National

Dr. Gross is director of psychometrics and research at the National Board of Examiners in Optometry in Chevy Chase, MD.

Board utilizes quality control procedures to limit fluctuation. Therefore, the fluctuation in difficulty levels and standards is nominal. For the 48 Part examinations (i.e., Part I, IIA, and IIB from 1981-86; Basic Science and Clinical Science from 1987 on) administered to date under criterion-referenced procedures, the pass-fail cutoff score has neither been below 58% nor above 64%.

Results

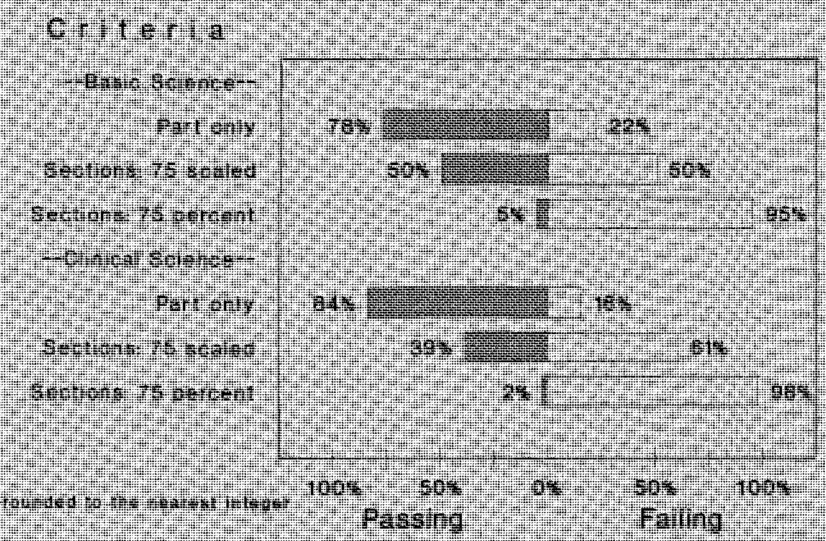
To analyze the effects of section criteria, the Basic Science and Clinical Science examinations of April 1989 were analyzed. Figure 1 displays the comparative pass-fail rates for each Part. These data are displayed for three criteria: the Part only, a scaled score of 75 for each section, and a percentage score of 75 for each section.

These data reveal a dramatic increase in failure rates for each Part as a result of applying section scaled score criteria. For Basic Science, the failure rate would more than double, increasing to 50%. For Clinical Science, the use of section scaled score criteria would nearly quadruple the failure rate. With these criteria, 61% of the candidates would fail Clinical Science.

If these increases can be described as dramatic, the use of multiple section criteria based on 75 *percent* can be considered extreme. In Basic Science, the requirement of 75% in each section would produce a failure rate of 95%. Thus, *nearly all* candidates would fail. In Clinical Science, the corresponding failure rate would be 98%. As in Basic Science, nearly all candidates would fail.

Since most section mean scores are below 75% correct, the extremely high failure rates produced by cutoff scores of 75% should not be surprising, since more than 50% of the candidates would fail *each* section. What are the implications of these elevated failure rates?

FIGURE 1
Comparative Pass-Fail Percentages*



*rounded to the nearest integer

TABLE 1
Examination Summary Statistics#

Examination	Mean Score Percent	Mean Score Scaled	Pass-Fail Cutoff Score* Percent	Pass-Fail Cutoff Score* Scaled	Pass-Fail Percentages* Pass	Pass-Fail Percentages* Fail
Basic Science Total	67	398	61	300	78	22
Human Biology	63	79	58	75	73	27
Ocular/Visual Biology	67	80	59	75	79	22
Theoretical, Ophthalmic, & Physiological Optics	68	79	62	75	74	26
Psychology	73	82	62	75	90	10
** Basic Pharmacology	67	80	58	75	82	18
Clinical Science Total	70	419	63	300	84	16
Systemic Conditions	74	86	56	75	96	4
Ocular Disease/Trauma	71	80	65	75	79	21
Refractive Oculomotor/Sensory Integrative Conditions	70	81	61	75	81	19
Perceptual Conditions	67	80	61	75	79	21
Public Health	64	78	60	75	72	28
Clinicolegal Issues	65	79	58	75	77	23
** Clinical Pharmacology	74	84	62	75	91	9

#All statistics are rounded to the nearest integer
*Based on National Board criteria, candidates pass or fail Parts only, not sections. The section pass-fail data apply only to meet existing stae board requirements.
**Pharmacology items are also scored in other sections

Are they valid, indicating a dismal quality of education, or are they artifacts of a harsh scoring system?

From both an optometric and psychometric perspective, multiple section criteria are abundant in artifacts. This is best illustrated by comparing the projected failure rates for Basic Science and Clinical Science. Based on the overall Part score only, Basic Science had a higher failure rate than Clinical Science, which is typical for National Board examinations. However, when utilizing section criteria based on either scaled or percentage scores, the failure rate for Clinical Science would actually exceed that for Basic Science. Clinical Science would have a higher failure rate because it has more sections.

More sections confront candidates with more hurdles, and more hurdles create more ways to fail. This situation is analogous to the aforementioned example of compound versus simple interest. Although the failure rate based on the overall Part score was lower in Clinical Science, by having more sections, Clinical Science would have a higher rate of "compounding," and thus, a higher failure rate with multiple criteria. Considering that students traditionally perform better in Clinical Science, and that some degree of academic attrition has screened out poorer students, the failure rate in Clinical Science should logically be lower than that for Basic Science. However, as the data indicate, this would not occur with the use of multiple section criteria. The resultant elevated failure rates do not, therefore, appear to be related to the quality of education.

Discussion

Any application of multiple section criteria will elevate failure rates. This principle applies, *regardless* of the standard setting methodology. Although criterion-referenced standard setting is preferable to grading on a curve, the artifically high failure rates reported here result from a *compounding* of the failure rates, rather than from the methodology used to determine the pass-fail score. However, the extent of the increase in failure rates is affected by several factors, which are listed below.

- number and type of sections
- length of the sections
- interrelatedness of the sections

The number of sections which must be passed will likely have the greatest impact on the failure rate increase. The comparative failure rate increases in Basic Science and Clinical Science illustrate this principle. Despite candidates performing better on the overall Clinical Science examination, the existence of more sections in Clinical Science would have yielded a higher failure rate than for Basic Science. The underlying principle is very simple: with multiple criteria, the more criteria, the higher the failure rate. This effect is applicable to cognitive written examinations with multiple section criteria, and to psychomotor practical examinations with multiple station criteria.

Since the use of multiple section criteria can significantly lower the probability of passing, there should be rules for determining the number and type of sections. On National Board written examinations, the criterion for section identification is based on a discipline approach. With an objective of achieving integration between Basic Science and Clinical Science (e.g., Human Biology in Basic Science is linked to Systemic Conditions in Clinical Science), this section system operates very effectively. However, the National Board bases its pass-fail determination on the Part score *only*; therefore, by National Board criteria, the classification of test content has no effect on pass-fail decisions.

When states apply multiple criteria, the section classification can artificially elevate the failure rate. The Clinical Science examination provides a good example of this artifact.

The Clinical Science examination was first administered in 1987. This examination replaced Part IIB, which was deemed to be the equivalent. However, Part IIB had four, rather than the seven sections identified in Clinical Science. One factor responsible for Part IIB having fewer sections was that old section 8 included both Public Health and Clinicolegal Issues, which are separate sections in Clinical Science. Thus, for states with multiple section requirements, the same candidate with the same overall level of performance would be less likely to pass Clinical Science than Part IIB, despite their equivalent content. This disparity is not because the pass-fail standard in Clinical Science became more rigorous, but simply because another hurdle was added.

The division of test content raises other concerns. Most importantly, what should constitute a section? Or, in a practical examination, what should constitute a station? On written examinations, traditional disciplines may be used to achieve test integration vertically (e.g., between Basic Science and Clinical Science). Alternatively, an organ or suborgan taxonomy may be used to achieve integration horizontally, as is done in the examination for the Treatment and Management of Ocular Disease. Neither approach is inherently superior to the other. However, the two approaches produce a different number of sections. The test with more sections to be passed will produce a higher failure rate, despite the same level of candidate performance.

Consider another dilemma. In optometric practice, contact lenses, for example, could be considered sufficiently important to be a separate section. In fact, some practitioners regard contact lens treatment as a specialty. However, if a separate section and corresponding passing standard were created, the overall failure rate would increase, not because of candidates becoming "less smart," but simply because of an increase in the rate of compounding failure. In contrast, if Public Health and Clinicolegal Issues were recombined to form a single section, the failure rate would decrease. Of course, this would not be because of students suddenly becoming "smarter," but because of a decrease in the rate of compounding.

Performance tests (i.e., practicals) appear to be even more prone to artifically high failure rates resulting from compounding. In practicals, the division of content is typically a function of either subject matter discipline, or instrumentation. Ultimately, this partitioning creates a division of labor that becomes a basis for the multiple criteria. Many state board practicals have five stations, some have as many as seven. When each station must be passed, practicals with more stations are very likely to have a higher failure rate than practicals with fewer stations, assuming all other criteria and levels of candidate ability are the same. The disparity in the failure rates is an artifact resulting from a higher rate of compounding.

Still another factor affecting the failure rate is whether test items can be scored in more than one section. Such is the case with both the Basic Science and Clinical Science examinations. In both examinations, the Pharmacology section consists of items already classified and scored under other sections. As a result, the use of multiple sections places candidates in a "double jeopardy" situation where erroneous item responses are applied to two sections *simultaneously*. Since multiple criteria produce a failure if only one section is failed, the scoring of items in more than one section further elevates the failure rate artificially.

Test length is another factor affecting failure rates with multiple criteria. The shorter the section, the more likely a candidate with an overall passing score is likely to fail. This is because short tests (i.e., tests with relatively few items) have comparatively low levels of reliability. The most serious implication is that candidates have little margin for error on a short section. For example, with only 12 items administered in Clinicolegal Issues, a candidate could fail the section by missing only 5 items. Nonetheless, he or she could achieve an overall Part score greater than 90%, a score significantly higher than that of most passing candidates. Yet, just a handful of errors in a short section can override what would otherwise be excellent performance.

A similar factor is the interrelatedness of the sections. When sections are interrelated (i.e., have high correlations with each other) candidates who score high in one section tend to score high in the other, and candidates with low scores in one tend to achieve low scores in the other. This issue was discussed by Algina and Gross[2] who pointed out the close correspondence between total test score and the number of sections passed on a Basic Medical Science examination.

Correlations on National Board examinations are usually fairly high for most sections. However, sections such as Public Health and Clinicolegal Issues tend to provoke somewhat different levels of performance than other sections. This appears to result from these sections having more of a social science than a physical or biological science orientation. Public Health and Clinicolegal Issues are also somewhat more generic to health professions in general, than they are to the optometric profession in particular.

The purpose of discussing the distinctive characteristics of Public Health and Clinicolegal Issues is not to lessen their importance. Instead, the intent is to point out that their unique perspective may produce different test response patterns which may artificially elevate the failure rates if multiple section criteria are applied.

Mehrens and Phillips[3] provide a useful summary for applying multiple test scores for pass-fail decisions. Three approaches are discussed: conjunctive, disjunctive, and compensatory models. A conjunctive approach requires all elements to be passed, while in the disjunctive approach, only one element must be passed. The compensatory approach, as noted earlier, allows a strength in one element (i.e., surplus of points) to compensate for a weakness (i.e., deficit of points) in another.

This paper has recommended that for each specific National Board examination, state boards using a conjunctive approach change to a compensatory one. However, it may be of interest to state boards that all three standard setting models will remain in the overall licensure process. Results from *within* an individual examination would be used on a compensatory basis. However, each examination would only have to be passed one time. Regardless of the number of failing attempts, or the margin of failure, the examination (e.g., Basic Science) standard remains the same. This is a disjunctive model.

The conjunctive standard, which is the most stringent, provides the ultimate shape to the licensure process. *All* candidates would be required to pass the National Board Basic Science Examination, *and* the National Board Clinical Science examination *and* a practical examination, *and* of course, they would be required to have graduated from a COE-accredited school or college of optometry. Thus, all three approaches are operational. Optimal decision making is dependent on applying the most suitable model to the variety of data that are provided.

Conclusions

The data presented in this study suggest that multiple pass-fail criteria exert a profound effect on the probability of being licensed. Multiple criteria confront candidates with multiple hurdles that can elevate failure rates dramatically. These increases result not from candidate ability, but rather, from the arbitrary classification of test content. The principle of compounding is primarily responsible for the resultant increased failure rates; as the number of hurdles increases, the failure rate increases. Eventually, if sufficient hurdles are presented, nearly all candidates will fail. Therefore, it is incumbent upon the licensure process to define the basis for content classification and multiple criteria, if the overall Part score is deemed insufficient for pass-fail purposes. This burden of proof is equally important for written and practical examinations, at both the national and state level.

State boards with multiple section or station requirements have a serious dilemma. If 75% is required, and applied literally, few if any candidates will be licensed. As a result, the public may be denied access to care by competent clinicians, and the state board may face antitrust litigation at a class action level. If multiple scaled scores of 75 are required, the failure rates will still produce sharply elevated failure rates, with the magnitude determined by artifacts such as the number of sections. Further perplexing is that these multiple criteria allow failing candidates to attain higher overall scores than passing candidates. The logic and defensibility of this outcome are precarious.

This standard-setting dilemma is the responsibility of the individual state boards to resolve. The simplest resolution is to require passing the overall Parts, regardless of section performance. This approach is recommended by the National Board as both an appropriate and sufficient standard. This standard is equal to the *weighted average* of the individual section *scaled* cutoff scores of 75.

State Boards unable or unwilling to use this approach will have to decide whether to subscribe to the spirit or the letter of their existing law. Based on a literal interpretation of some statutes or regulations, a score of 75% in each section would be required. The resultant pass-fail decisions may seriously limit health care access.□

References

1. Gross, LJ. Setting Cutoff Scores on Credentialing Examinations: A Refinement in the Nedelsky Procedure. *Evaluation and the Health Professions*, 8: 469-493, 1985.
2. Algina, J & Gross, LJ. Decision-Making in Basic Medical Sciences Examinations: Single versus Multiple Cutoff Scores. *Evaluation and the Health Professions*, 2: 203-208, 1979.
3. Mehrens, WA & Phillips, SE. Using College GPA and Test Scores in Teacher Licensure Decisions: Conjunctive versus Compensatory Models. *Applied Measurement in Education*, 2: 277-288, 1989.

Ocular Foreign Body Removal Workshops

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and Patti Augeri, O.D.

Abstract

Recent state laws expanding the scope of optometric practice have stimulated the development of new techniques for teaching therapeutic skills. This paper highlights a new technique of impregnating metallic foreign bodies into freshly slaughtered calves' eyes utilizing a CO2 powered air gun. Thirty to fifty particles are embedded in each eye at corneal depths from surface epithelium through to penetrating into the anterior chamber. This approach offers a realistic distribution of particle depth and size and a better "feel" of the instruments being used for foreign body removal than previous techniques. This technique has been used in workshops to teach foreign body removal to over 700 optometrists. These workshops are designed to present not only the mechanical skills necessary for foreign body removal but also the problem oriented evaluation and management of patients presenting with non-penetrating ocular foreign bodies. This paper also discusses the preparation and presentation of the workshops.

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Figure 2. *Eyeball shown in holder as seen through biomicroscope.*

(Photo by Cliff Scott, O.D.)

Key Words: Ocular Foreign Bodies, CO2 Air Gun, Calves' Eyes, Eye Safety

Introduction

A number of articles have appeared recently reporting the incidence of ocular foreign bodies and describing the clinical techniques for removing them.[1,2,3] However, an extensive search of the ophthalmic literature has not revealed any citations for the mechanics of teaching these techniques to practitioners in a systematic way and in a non-threatening environment. In the past, most practitioners (ophthalmology residents) have learned these techniques by the "looking over the shoulder of a more senior mentor" method or in a trial and error "let's learn while the patient is in the chair" scenario. More recently, teaching techniques have used Agar culture plates or calves' eyes simply impressed with foreign bodies. This approach generally results in teaching the removal of surface particles only.

This paper will describe a technique by which particles of various materials are impregnated into calves' eyes. This is accomplished by use of a CO2 air gun. The techniques to be described allow for the presentation of a more diverse workshop giving "hands on" experience to the student/practitioner, without the unsettling responsibility of having a patient's cornea being the site of the practitioner's first experience. The use of animal eyes for practice allows the practitioner to develop the skills and the confidence to add foreign body removal to his/her regimen of primary eye care where allowed by law or privileges. The variety and depth of embedded particles give the practitioner experience in removing foreign bodies at different corneal depths. The workshop also prepares the practitioner to assess those situations that require referral rather than treatment because of the depth and/or location of the foreign bodies.

Preparing the Calves' Eyes

Materials needed for foreign body placement

A number of items are necessary to embed foreign bodies. Calves' eyes which are readily available from local slaughter houses are approximately the size of human eyes. These calves have already been slaughtered for the preparation of veal products so there is no additional sacrifice of animals for these teaching purposes. Lamb, pig and rabbit eyes would also be acceptable but rarely are available in the northeast United States in the quantities necessary to run large workshops. Cow eyes are generally too large for the slit lamp holders. Freshly killed or freshly frozen eyeballs must be used since chemical fixing of the eyes alters the corneal appearance and structure. The use of freshly killed or frozen eyeballs circumvents any toxic waste problems caused by the use of some chemical fixatives. A 10% loss of eyeballs should be planned for, as there will be occasional total penetration into the anterior chamber and destruction of the eyeball using this technique.

The **slit lamp eyeball holders**[a] are adapted to clamp onto the most commonly used biomicroscopes. While other devices exist, these are the only ones known to the authors that are capable of adjusting the intraocular pressure to maintain the proper corneal resiliency. This is accomplished by use

TABLE 1
Procedures

1. Purchase CO2 air gun with special regard to local firearms ordinances.[a]
2. Acquire filings from local machine, automotive or locksmith shop. Mix with other non-metallic particles.
3. Acquire calves eyes from local slaughterhouse or wholesale butcher. Plan for 2 eyeballs for every 3 participants. Allow for 10% loss.
4. Set defrosted eyeballs into holders set up on dowels in backstop.
5. Pack cotton wadding into rotary magazine.
6. Load CO2 cartridge into air gun.
7. Load filings mixture into barrel of gun using tweezers.
8. Fire air gun at point blank range at eyeballs. Determine most efficient target distance through multiple trials.

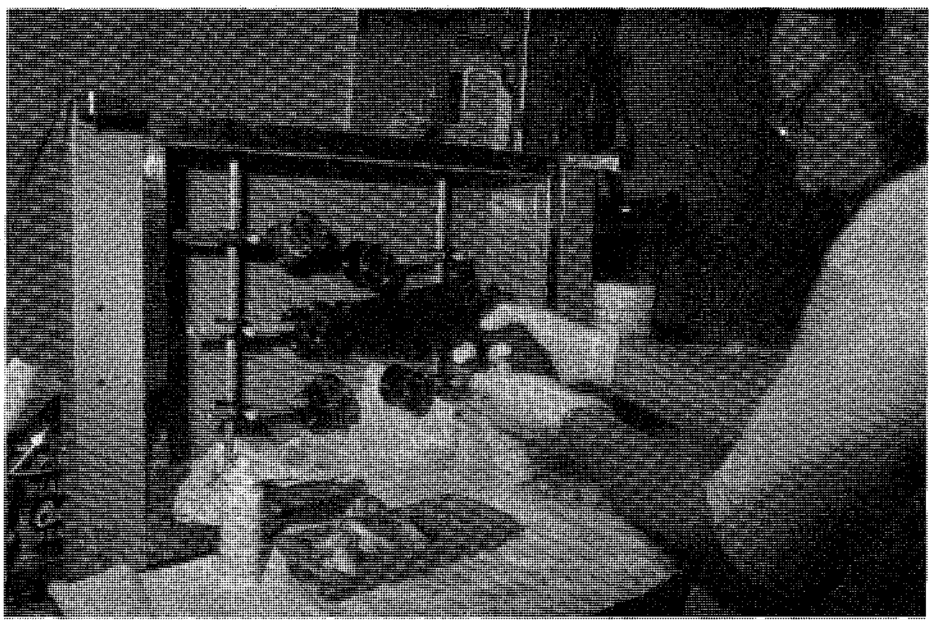

Figure 1. *Shooting of eyeballs with particular attention to safety features of backstop, eyewear, gloves and lighting. (Photo by Walter Potaznick, O.D.)*

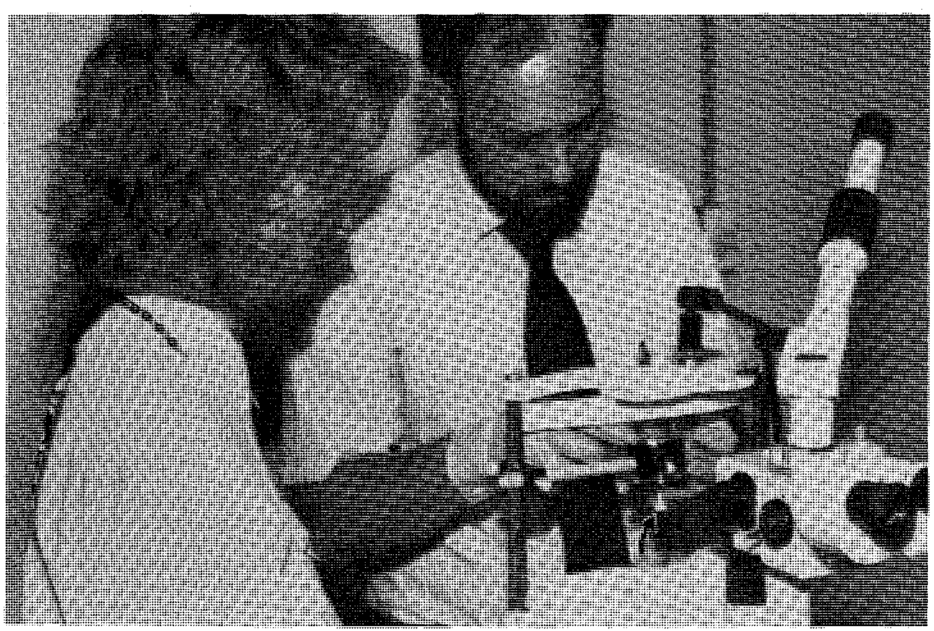

Figure 3. *Instructors preparing slit lamps for workshop. Arrow () indicates tension adjusting screw on holder. (Photo by Cliff Scott, O.D.)*

of an adjusting screw found on the back of the holder.

Assorted metallic and non-metallic foreign bodies include magnetic and non-magnetic metals (e.g. iron filings, brass, aluminum, copper, rust particles, etc.) and non-metallic items (e.g. wood splinters, glass, plastic, cotton wisps). The use of a wide variety of items familiarizes the participants with the diverse presentations they may see in the real clinical setting. Most of these items can be acquired from machine shops, locksmiths, automotive shops and around the house, usually at little or no expense.

A **CO2 air pistol** (rather than an air rifle) will give better control of the aim point when shooting the foreign bodies into the calves eyes. The specifications of the pistol can vary from model to model.[b] A **safe metallic backstop** rigged with metal or wood dowels to hold the eyeball holders is necessary. We have used a medicine cabinet wall insert found in most home or bathroom supply stores. **Small cotton balls** are used as wadding to project the foreign bodies uniformly through the barrel of the pistol. This is similar in theory to the wadding used in shotgun shells. **Safety glasses and surgical gloves** must be worn by the preparer for obvious safety reasons and should be worn at all times while handling both the calves' eyes and the air gun. Plastic ice cube trays work well as **eyeball storage holders**. These can be transported in ice chest (picnic) coolers with regular ice. Because dry ice requires careful handling, it should be avoided. A .5% Sodium Hypochlorite **Disinfectant** or a spray surface disinfectant provides adequate surface cleanup. A commonly used solution can be made by mixing 9 parts distilled water with 1 part 5% chlorine bleach.

Insertion Techniques (see Table 1)

Once proficient with the techniques, two dozen eyes per hour can be processed. Frozen eyeballs are defrosted using a cold water bath. This can take anywhere from 1/2 hour to two hours depending on the temperature of the water bath and freezer and the number of eyeballs being defrosted at one time. The use of a microwave is **NOT** recommended for defrosting.

Set up your backstop with the eyeball holders attached to the dowels in a safe, well-lit place. The eyeballs are placed in the holders and secured with the front plate provided. With the eyeballs facing towards you, the tension screw on the back of the holders is adjusted until the cornea just shows some white from edema.

The cotton wadding is held in place using the rotary magazine (pellet holder) of the air gun. The least amount of cotton necessary to fill the chamber space in each hold in the magazine should be used. The wadding should not be packed too tightly as this will increase the likelihood of eyeball penetration. The CO2 cartridge is loaded according to manufacturer's instructions. A hand pump operated air gun will work well but the CO2 powered system is more efficient if working with large numbers of eyeballs. With the barrel facing away from your face, a mixture of materials is loaded into the front of the barrel using tweezers. The air gun is then fired at point blank range at the eyeballs. (See Figure 1.) The exact shooting distance will be determined by the power of the air gun, the amount of CO2 left in the cartridge and some trial and error experimentation. The working distance for our set-up starts at about four inches for a full cartridge and decreases to point blank over the life of the cartridge. Each cartridge will provide about 75 usable shots or enough for about three dozen eyes. Two shots per eye should amply distribute about 30-50 particles at various depths, once the target distance has been determined. (See Figure 2.) The eyeballs are inspected for the number and depth of penetration of foreign bodies. Unless the workshops are to take place in the following three to four hours, the prepared eyeballs can be placed in the storage holders and be refrozen for future use.

Teaching the Workshop

Lecture Portion

The presentation of the workshop is a two-step process: a classroom type lecture using a slide or video presentation and the workshop itself. The topics presented in the lecture outline (Table 2) include: an introduction presenting the instructors of the workshop, TPA legislation updates, format of workshop, schedules, etc. followed by a discussion of the rationale for optometric involvement in foreign body removal. This discussion addresses issues of individual modes of practice, manual dexterity, availability and location of referral sites, first aid vs. therapy vs. surgery and reinforcement of the "do the patient no harm" and "the least invasive technique necessary" principles. Practice management ramifications include the use of proper telephone history and triage techniques, the preparation of eye emergency trays, medical-legal issues and billing procedures, etc. Safety (e.g. no needle recapping) and hygiene issues (of instruments, patient and practitioner) are strongly emphasized. Evaluation techniques review the use of the problem oriented history, visual acuities, topical anesthetics, biomicroscope, fluorescein, lid eversion, etc.

The foreign body removal techniques can be presented in a slide or video format with running commentary by the instructor emphasizing the important factors as they relate to each specific

TABLE 2
Ocular Foreign Body Removal

RATIONALE AND RESPONSIBILITIES—Should O.D.'s remove ocular foreign bodies?

HISTORY
MATERIAL—Metallic, chemical, vegetative, inert.
WHEN—The more recent, in general, the easier to remove completely.
ENVIRONMENT—Wind, working conditions, machinery, safety specs.
ACTIONS—Irrigation or attempts to remove by patient or others.
EYE REACTIONS—Decreased VA, injection, pain, photophobia, tearing.

ASSESSMENT
V.A.—Aided or unaided acuities with pinhole.
ANESTHETIC—Instill before VA if necessary.
PUPILS
SLIT LAMP—Determine location, depth and size of foreign body.
FLUORESCEIN—Pooling, tracks, perforation?
LID EVERSION—Upper lid, double evert if necessary.
ANTERIOR CHAMBER—Cells or Flare, penetration (of F.B. or NaFl).

REMOVAL—PATIENT REASSURANCE AND INSTRUCTIONS—Do not move head or eyes!!!!
ORDER OF TECHNIQUES—Always work tangential to cornea in case patient does move.
1. IRRIGATION—Squeeze or spray saline; Strong, steady stream.
2. Q-TIP—Dry if protruding; Wet if flat.
3. NYLON LOOP—Lubricate with CL wetting or lubricant solution.
4. MAGNET—If history indicates magnetic particles.
5. SPUDS—Blunt edged for flicking out. Sharp edge for carving.
6. NEEDLES—Large gauge (18) for large F.B., Small gauge (25) for small F.B. Keep bevel pointed away from you.
7. ALGER BRUSH, OPHTHO BURR—Remove rust ring at follow-up visit, if possible. Excess pressure will stop burr from penetrating cornea.
8. IRRIGATE AND REASSESS

POST REMOVAL AND FOLLOW-UP CARE
1. INSTILL CYCLOPLEGIC—Cyclopentolate, Homatropine, Scopolamine.
2. INSTILL BROAD SPECTRUM ANTIBIOTIC—Polysporin, garamycin, erythromycin.
3. PATCH—"T" patch or pressure patch. DO NOT PATCH FOR MORE THAN 24 HOURS!!!
4. PATIENT EDUCATION—Significant pain, photophobia, etc.
5. FOLLOW-UP IN 12-24 HOURS. Reassess and consider one of the following:
   A. Refer if necessary
   B. Repatch x 24 hours
   C. Ointment patch with antibiotic
   D. D/C therapy return P.R.N.
6. LONG TERM ISSUES
   A. Recurrent corneal erosions (RCE)—Lubricant Drops day, ointment H.S., hypertonic NaCl, night patching or referral for other therapy
   B. Glare—Scar on visual axis—Sunglasses and education

FINAL COMMENTS
Your professional judgment is your *most* valuable tool. Make full use of your skills, experience and training and availability of support services and common sense to decide on the most appropriate actions on a case-by-case basis.

technique or instrument. The order of presentation is designed to reinforce the "least invasive philosophy." (Table 2)

Discussion of patient follow-up care and management includes treatment of rust rings, post-removal evaluation, various patching techniques and return visits. It also addresses the possibility of long-term sequelae, such as reduced visual acuity and/or glare from scarring and recurrent corneal erosion.

Workshop Portion

The workshop portion can be taught efficiently with one instructor for every 5-6 slitlamps with teaching tubes. (See Figure 3.) As the number of participants increases, it makes sense to divide the workshop into two areas: one teaching removal techniques, the other teaching patching techniques with the participants rotating through the two sections. Three instructors can easily handle groups of about 20-24 depending on space and equipment availability.

The following equipment and supplies are necessary for the workshop itself:

The workshop is a hands-on session utilizing the instruments and techniques discussed in the lecture portion. The participants are again encouraged to follow the "least invasive" format on the calf's eye.

1. Biomicroscopes with observation tubes.
2. Calf eyes with impregnated foreign bodies.
3. Slitlamp eyeball holders attached to vertical headrest rails at the height of the canthus aligning marks.
4. Paper towels.
5. Saline in squeeze or aerosol bottles.
6. Alcohol wipes or other means of cleaning and disinfecting.
7. Instruments for foreign body removal
   a. Cotton swabs on 6 inch wooden applicators
   b. Foreign body bar magnet
   c. Foreign body nylon loop
   d. Blunt edged sput (golf club, j-shaped)
   e. Sharp edge spud(s) (single or double lancet)
   f. Jeweler's forceps
   g. Small chalazion scoop (optional)
   h. Needles (18 and 25 gauge)
   i. Rust ring remover with spare batteries
8. Patching supplies
   a. Paper, cloth and plastic tape (1" rolls)
   b. Sterile eye pads
   c. Velcro T-patches

9. Pharmaceuticals for demonstration purposes
   a. Topical anesthetic
   b. Antibiotic ointment
   c. Mydriatic (Cyclopentolate, Homatropine, Scopolamine)
10. Disposable sterile gloves

The workshop is a hands-on session utilizing the instruments and techniques discussed in the lecture portion. The participants are again encouraged to follow the "least invasive" format on the calf's eye, working from surface to deep layers using the more sophisticated instruments to remove the more deeply embedded particles. (Table 2) The participants are supervised by the lab instructors through the observation tubes of the slitlamp microscopes. These workshops should be scheduled as soon after the lecture portion as possible to maximize transfer of the lecture material presented into properly developed manual skills.

Discussion

With the rapid expansion of the use of therapeutics in optometric legislation and curriculum, it is necessary to broaden the scope of the methods routinely taught in the optometry schools and optometric continuing education programs. The preparation and presentation of these workshops involve instructor time, organization and some expense. Given the large numbers of practitioners and optometry students who will be trained in these techniques, however, the end results are well worth the effort necessary to present an effective workshop. The workshops can be presented on their own or as part of a major TPA program. The workshops are interactive as many participants will bring previous foreign body removal experience with them. Many of the techniques in our workshops were added and/or modified as a result of the suggestions of the participants themselves. □

Footnotes

[a]The eyeball holders were designed by and are available directly from Robert J. Ellis, Sr., Director of Technical Services at the Pennsylvania College of Optometry.

[b]The author uses an air gun with the following specifications and ballistics parameters:
Manufacturer: Crosman Air Guns
Model: 357 Pellet Gun
Caliber: .17 inch
Propellant: CO2 gas cartridge with Cotton Wadding
Projectiles: Assorted non-magnetic and magnetic filings including brass, iron, steel, aluminum, copper, and rust as well as non-metallic materials such as wood, glass, plastic and cotton.
Projectile Velocity (listed by Crosman): 380-430 fps at 70°F.

[c]The legal issues concerning the use of CO2 powered firearms vary from state to state, city to city, etc. Check with your local law enforcement agencies prior to using these techniques. As with all firearms, the use of proper safety eyeware is essential. The authors assume no responsibility for any injuries or violations of local, city, state or firearm ordinances arising from the use of these techniques or materials described.

References

1. Macewen CJ. Eye injuries: a prospective survey of 5671 cases. British Journal of Ophthalmology 1989, 73; 888-894.
2. Accident Facts 1989 Edition, National Safety Council, 36-37.
3. Hall JR. Mechanical corneal injuries. Problems in Optometry Oct-Dec 89 1(1):32-39.

InSight™: A Series of Interactive Experiments and Demonstrations in Vision Science for the Macintosh™ Computer

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Abstract

We have taken advantage of the Macintosh's graphical interface in creating Insight™, a series of interactive HyperCard stacks. The InSight™ series consists of ten stacks that provide students with first-hand experience with a number of interesting visual phenomena, as well as a variety of experimental data acquisition and analysis techniques. Each stack contains background information on the topic of the experiment, instructions, references that provide the student with an entry point into the relevant literature, and questions to be answered upon completion. InSight™ provides a unique supplement to classroom lectures, as well as a structured environment within which students can interact with a computer and explore software that is complex and, at the same time, easy to use.

Key Words: Macintosh™ Computer, Educational Software, Computer-Aided Instructions, CAI

Introduction

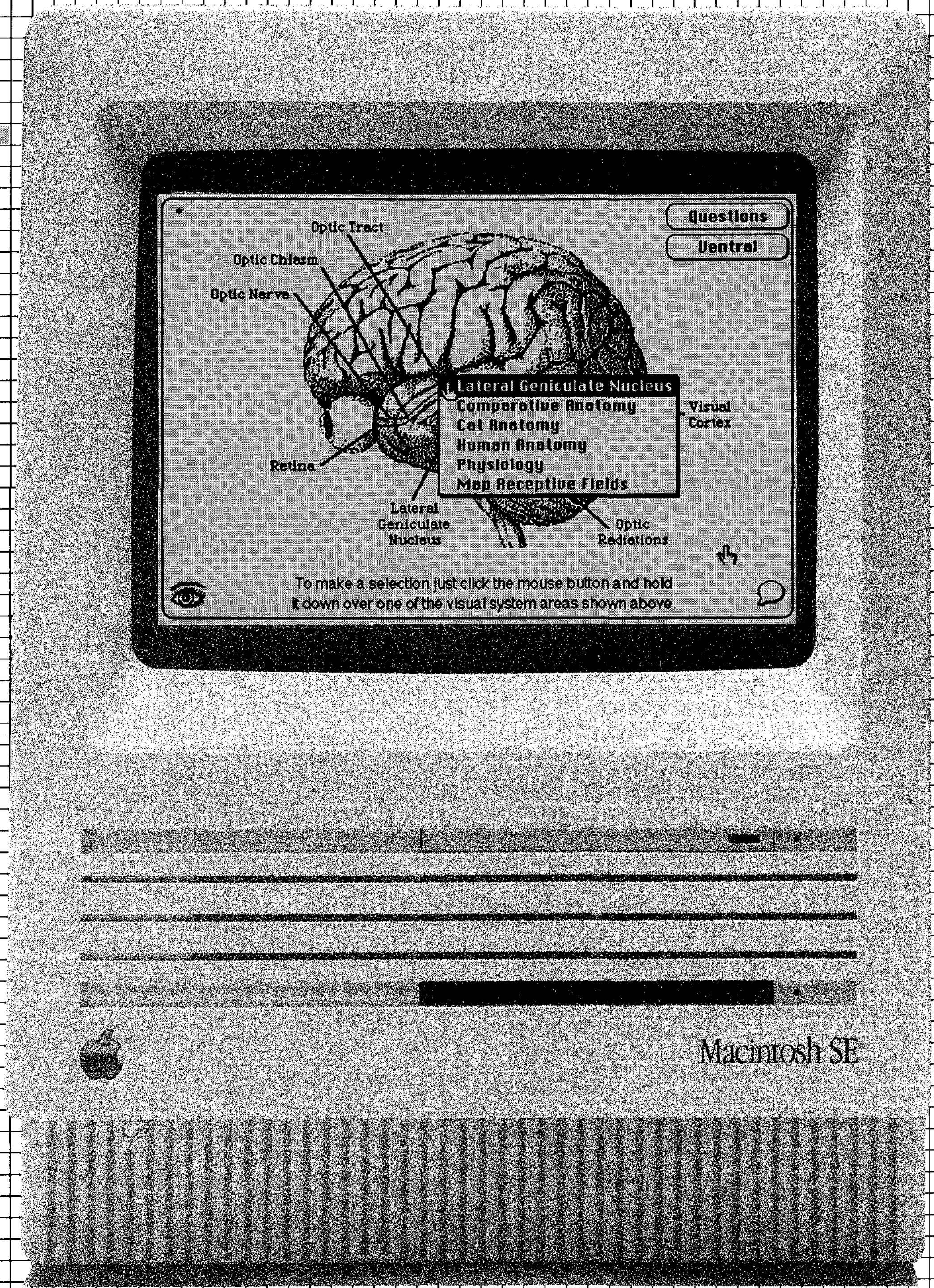
The Macintosh™ computer, and the HyperCard™ programming environment in particular, now make it relatively easy to develop easy-to-use, interactive demonstrations that include sophisticated graphics, animation, and digitized sounds. We have taken advantage of these capabilities in creating InSight™, a series of interactive experiment and demonstration programs for use in vision science, sensation and perception, neural science, and experimental psychology classes.

Some of the experiments in InSight™ were originally developed several years ago on the Apple II computer for use in an undergraduate Experimental Psychology laboratory class. In order to gain experience in research methodology, students performed a number of experiments in the laboratory portion of the class. Students used the data they gathered to prepare APA-style papers. By programming these experiments on the computer, we were able to eliminate the need for a variety of equipment and the time required to set it up for each of the different experiments. When HyperCard™ became available we translated many of these experiments to the Macintosh™ in order to take advantage of its superior user interface and graphics capabilities. Additional experiments and demonstrations have since been added to the Macintosh™ version of the series that exploit the unique strengths of HyperCard™ as an interactive graphical database.

InSight™ is a series of HyperCard™ stacks designed primarily for use in educational laboratories, such as those associated with graduate and undergraduate classes in vision science, sensation and perception, and experimental psychology. The software is currently being used at the School of Optometry, University of Missouri-St. Louis to accompany our basic science classes, Monocular Sensory Processes and Binocular Vision. The InSight™ series consists of ten interactive demonstrations and experiments that provide students with first-hand experience with a number of interesting visual phenomena as well as a variety of experimental data acquisition and analysis techniques. InSight™ is intended for use as a supplement to classroom lectures and was created with the following objectives in mind: (1) to provide students with hands-on experience with some of the most commonly used psychophysical techniques, (2) to generate experimental data sets that can be subjected to further analyses and used as a basis for written reports, and (3) to permit students to experience and interact with a number of interesting visual phenomena that cannot be fully appreciated on the basis of a lecture or a written description in a textbook.

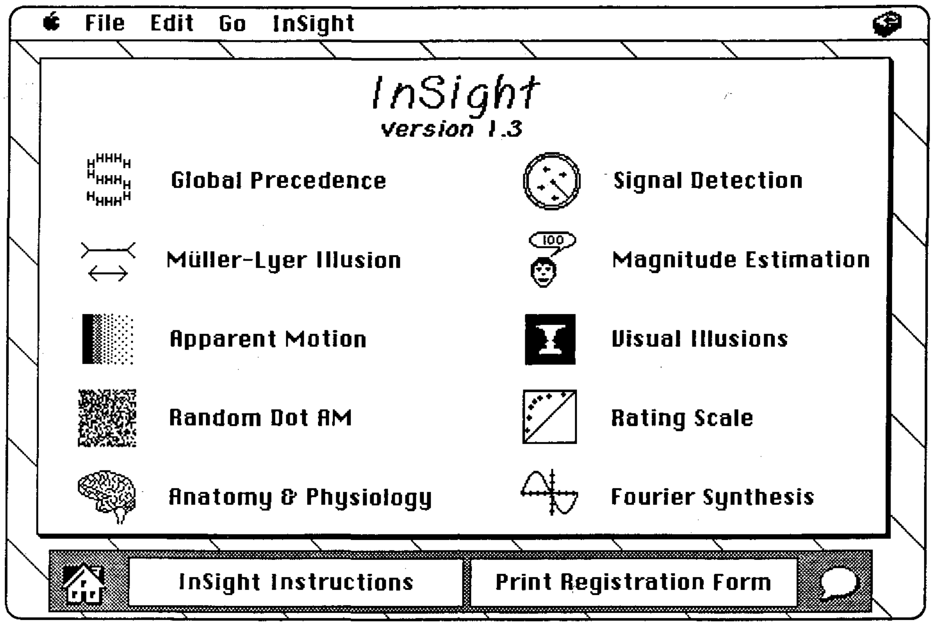
The stacks in the Insight series can be divided into two general categories, experiments and interactive demonstrations, each of which can be accessed from a main menu card (see Figure 1). In addition to a card containing icons representing each of the stacks, the main menu stack also contains instructions explaining, among other things, general operation of the InSight™ stacks and the features common to all of the stacks in the series (see Figure 2). Each experiment stack illustrates a particular psychophysical procedure in an area of interest to vision scientists and experi-

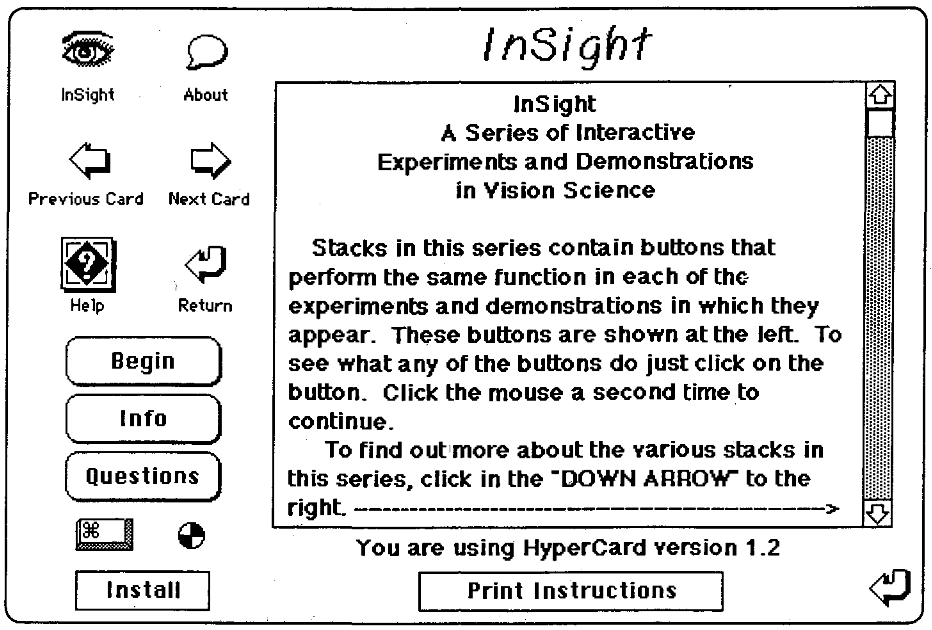
Dr. Baro is a research associate, Dr. Lehmkuhle is an associate professor, and Dr. Sesma is an assistant professor at the University of Missouri-St. Louis School of Optometry.


Questions
Ventral
Optic Tract
Optic Chiasm
Optic Nerve
Lateral Geniculate Nucleus
Comparative Anatomy
Cat Anatomy
Human Anatomy
Physiology
Map Receptive Fields
Visual Cortex
Retina
Lateral Geniculate Nucleus
Optic Radiations
To make a selection just click the mouse button and hold it down over one of the visual system areas shown above.
Macintosh SE

mental psychologists and generates a data set that is summarized, analyzed, and/or graphed at the completion of the experiment. Figure 3, which shows one of the "Results" cards from the Rating Scale experiment (see below for a description of this experiment), illustrates the kind of analysis obtained at the completion of a typical experiment. Each demonstration stack illustrates a particular visual phenomenon and permits the student to interact in various ways to gain a better understanding of the phenomenon (demonstrations do not generate data sets). Each stack can be completed in 5-10 minutes.

Each of the stacks contains an introduction that provides background information on the topic of the experiment or demonstration, instructions for the procedure to be used, references that provide the student with an entry point into the relevant literature, and questions on the procedure or topic to be answered upon completion of the experiment or demonstration. "Help" buttons are also present in some of the demonstrations to provide additional information and instructions. Students answer questions by typing directly in answer boxes on the "Question" cards (see Figure 4). All questions can be edited so that lessons may be tailored to suit the needs of the class and questions can be locked to prevent accidental changes by students ("Edit Questions" and "Lock Questions" buttons





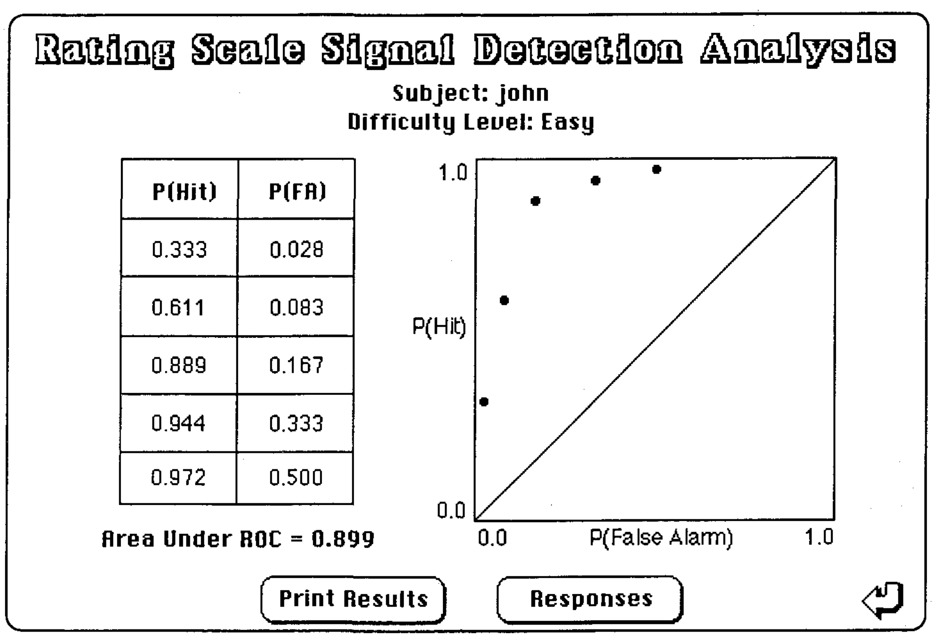


Figure 1. (top) *The InSight™ "Main Menu" card. Access to each of the experiments and demonstrations, as well as instructions, credits, and other information, is available by clicking icons and other buttons. Students are not required to learn a command language or complicated syntax and rarely even need to use the keyboard.*

Figure 2. (middle) *The InSight™ "General Instructions" card provides information on the use of a number of buttons common to each of the stacks in the series as well as other general information, including the objectives of the InSight™ series, brief descriptions of each of the stacks, and system requirements.*

Figure 3. (bottom) *A "Results" card from the Rating Scale stack illustrates the analysis and graphical display of the data obtained upon completion of a typical experiment.*

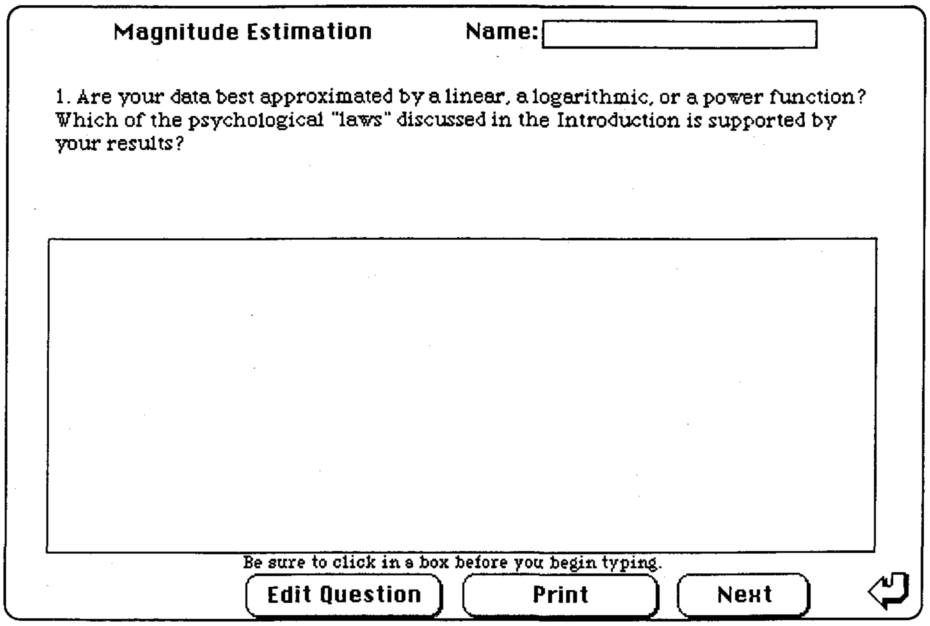


Figure 4. *A "Questions" card from the Magnitude Estimation stack can be used to assess students' understanding of the principles illustrated in a demonstration or experiment. Questions can be edited to adapt the lesson to the needs of a particular class.*

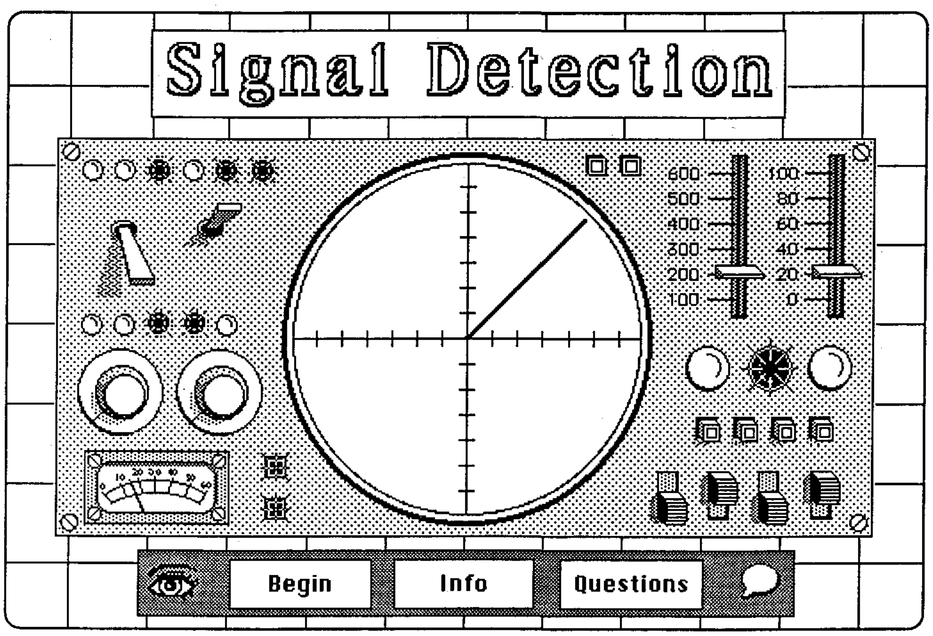


Figure 5. *The title card from the Signal Detection stack contains buttons that begin the experiment or take the student to the instructions/background information or to the questions.*

are provided on each "Questions" card). "Print" buttons are also present on most cards to permit students to easily generate hardcopy of the background information, instructions, references, experimental results, and questions and answers. Experimental results and answers to the questions are automatically deleted when the student exits the stack.

Program Description

The following is a brief description of the experimental paradigm illustrated in each experiment stack and of the subject matter of each demonstration stack.

Experiments

Global Precedence. This experiment utilizes a choice reaction-time procedure to demonstrate the differences in visual processing time of the global and local characteristics of a visual stimulus. Stimuli consist of large, "global" letters made up of smaller, component "local" letters. The task requires the student to identify, as quickly as possible, either the global or local letters, depending on the condition. The influence of purely visual processes on a higher level function, letter recognition, is revealed.

Muller-Lyer Staircase. A staircase procedure is used to measure the magnitude of the Muller-Lyer illusion. A "standard" and a "test" stimulus are compared in this experiment. If the student indicates that the test stimulus appears shorter than the standard, the length of the test stimulus is reduced in the following trial; if the student indicates that the test appears shorter, the length of the test is increased on the following trial. Parameters known to influence the magnitude of the illusion (e.g., the size of the arrowheads, the presence of the connecting lines) can be manipulated.

Signal Detection—YES/NO. A YES/NO procedure is used to illustrate a real-life application of signal detection theory. The student assumes the role of a radar operator who must detect the presence or absence of an enemy aircraft from among a number of friendly aircraft (see Figure 5). Response criterion is manipulated by varying the difference in appearance between hostile and friendly radar blips and by varying the number of enemies present. Hit and false alarm rates are calculated for each criterion level.

Signal Detection—Rating Scale. A two-alternative forced-choice procedure is used in conjunction with a rating scale in this experiment in which the student must rate the difference in gap size between two Landolt rings. The stimulus consists of two Landolt rings presented side by side. Students indicate with a rating between 1 and 6 how certain they are that the size of the two gaps is the same or different. Response criterion is manipulated by varying the size of the gaps. The data are used to generate an ROC curve and the area beneath it is calculated (see Figure 3).

Magnitude Estimation. A magnitude estimation procedure is demonstrated in this experiment in which the student estimates dot density in random-dot patterns. Random-dot stimuli are presented and the student assigns a number to each stimulus to indicate the apparent density of the dots relative to other stimulus patterns. A number of variables known to influence the results of a magnitude estimation procedure (e.g., stimulus spacing, stimulus range, magnitude of the standard, the use of a modulus) can be manipulated. The perceived magnitude function is plotted on linear, semi-log, and log-log scales and regression analyses are performed.

Demonstrations

Apparent Motion. Phi movement is demonstrated with a variety of stimulus shape combinations. The demonstration consists of a two-frame animation in which each frame contains a stimulus object in a different location on the screen. The space between the two stimuli, inter-stimulus interval, rotation, and other parameters known to affect the quality of the perceived movement can be manipulated.

Random-Dot Apparent Motion. Random-dot patterns (referred to as random-dot cinematograms in this context) are used to demonstrate the independence of motion and form perception. Movement of an apparently solid object within a random-dot pattern can be perceived even though the apparently solid object cannot be seen when the movement stops. Dot density, dot displacement, the presence of intermediate frames, and other parameters known to influence the perception of random-dot motion and reveal the presence of two distinct motion detection mechanisms can be manipulated.

Anatomy and Physiology. The anatomy of the visual system of various species, including cat, monkey, and human, is illustrated in great detail with over 70 photographs and drawings (reference citations are provided for each illustration so that students can consult the original works). Physiology of the retina, ganglion cells, the lateral geniculate nucleus, and the visual cortex is described and illustrated with experimental data. Students navigate this stack by clicking on areas of the brain on a main menu card and making their selections from pop-up menus that appear in the spot where they clicked (see Figure 6).

This stack also includes an interactive demonstration in which the receptive fields of ganglion, LGN, and cortical cells can be interactively mapped on the computer screen in much the same way as it is done in the laboratory. In order to map receptive fields, the student selects from a number of stimulus shapes and orientations and then moves the cursor around the screen, listening for a change in the spontaneous activity

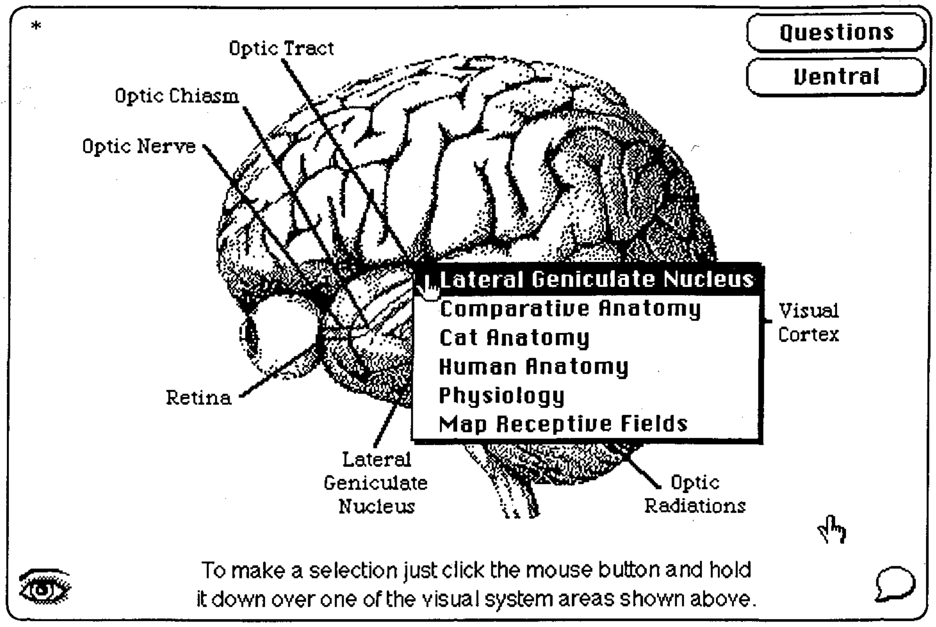


Figure 6. *The main menu card from the Anatomy & Physiology stack shows a lateral view of the brain. Buttons are available to rotate the brain to a ventral view or take the student to the questions. The student navigates this stack by clicking on different areas of the brain and making selections from the pop-up menus that appear. The pop-up menu for the lateral geniculate nucleus is shown.*

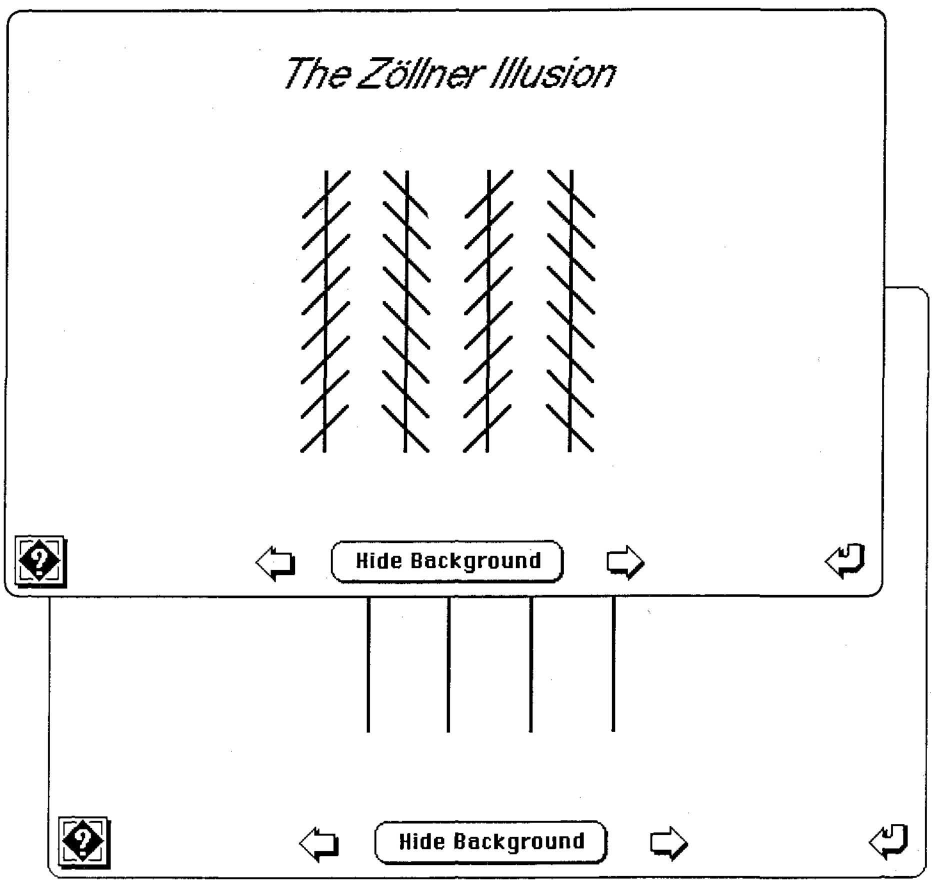


Figure 7. *Two views of a card from the Illusions stack. Many of the illusions permit the student to remove the portion of the figure responsible for the illusion. Navigation in this stack is accomplished with the arrow buttons which take the student to the next or previous cards. Each card in this stack also contains a "Help" button which displays information about the illusion on that card.*

of the hypothetical cells. Clicking the mouse turns the stimulus on and off and students can draw marks on the screen to indicate the edges of the receptive fields. When the student is satisfied that all receptive fields have been found, their actual locations are shown. Receptive fields are placed in different, randomly-selected positions each time through the demonstration.

Visual Illusions. Over 30 illusions, reversible figures, aftereffects, and other interesting visual phenomena are shown. Information about each illusion is available and, for many of the illusions, the portion of the figure responsible for the illusion can be removed (see Figure 7).

Fourier Synthesis. The principles of Fourier analysis and synthesis are illustrated. Students can generate and superimpose simple sinusoidal waveforms and generate complex waveforms by adding and subtracting harmonics, which can be varied in phase, amplitude, and frequency, to a fundamental sine wave.

System Requirements and Availability

Insight™ requires a Macintosh Plus, SE, or II series computer with at least 2 MBytes of memory, a hard disk, and HyperCard™ software, version 1.2.2 or later (HyperCard™ is currently provided with new computers as system software; a free copy or upgrade can be obtained from any authorized Apple dealer or bulletin board service). If you would like to be able to produce hardcopy output, a printer is also needed. InSight™ is distributed as shareware and can be obtained at no charge by contacting the authors. InSight™, as well as a number of other new hypermedia software products, is also available, for a nominal charge, from the Hypermedia and Instructional Software Clearinghouse, c/o R. Scott Grabinger, University of Colorado-Denver, Campus Box 106, 1200 Larimer Street, Denver, CO 80204-5300.

Conclusions

There are a number of advantages to using interactive HyperCard™ stacks such as InSight™ for instruction. First, InSight™ provides an environment in which students actively interact with the program at their own pace. Each stack is a complete, self-contained lesson with an introduction and background information, an experiment or demonstration to complete, and questions for the student to answer upon completion. References are also provided so that the student can consult the original works upon which the stacks are based.

Another advantage is that stacks in the InSight™ series can be tailored to meet the needs of a particular class. Questions can be edited by the instructor. In addition, the InSight™ stacks are unprotected; all scripts are thoroughly documented and can be easily modified to provide additional capabilities. This benefit is a result of developing software in the HyperCard™ environment. HyperTalk™, the programming language of HyperCard™, is a relatively simple, object-oriented language that is accessible to those without extensive programming experience.

The InSight™ series consists of ten interactive demonstrations and experiments that provide students with first-hand experience with a number of interesting visual phenomena as well as a variety of experimental data acquisition and analysis techniques.

The need for students to learn a command language and its associated syntax has been eliminated. Except when answering questions, students rarely even need to touch the keyboard.

InSight™, and HyperCard™ software in general, provides an opportunity for students to interact with a computer in a relatively controlled situation. Even today, many graduate and professional students have little or no experience with computers, and some that have are discouraged by the complexity of other computer systems. All InSight™ stacks strictly adhere to the Macintosh™ user interface guidelines and, as a result, they provide a consistent, easy-to-learn, non-threatening environment in which students can explore software that is complex and, at the same time, easy to use. The need for students to learn a command language and its associated syntax has been eliminated. Except when answering questions, students rarely even need to touch the keyboard.

Finally, we are obligated to point out some of the disadvantages of InSight™ and the HyperCard™ environment. Because it uses an interpreted language, HyperCard™ can be slow at times. To help overcome this limitation, there is a means by which "external commands," written in a faster, compiled language, can be seamlessly integrated into the HyperCard™ environment. We have taken advantage of this capability and written some calculation-intensive routines (e.g., the calculation of complex waveforms in the Fourier Synthesis stack) in Pascal.

Other disadvantages which cannot be overcome so easily include cards limited in size to that of the original 9-inch Macintosh™ screen, the inability to use color, and the need for 2 MBytes of memory and a hard disk for acceptable operation of the programs.

We feel however, that some of these restrictions can also offer advantages. The size limitation makes it necessary to divide information into "card-sized" chunks, making individual components of a lesson more manageable for the student. This feature, together with the design of each stack as a self-contained unit, encourages "browsing" by the students. In addition, even though the display is in black and white, the high-resolution graphics and the ability to utilize scanned images more than compensate for the purpose of most demonstrations. All in all, we believe that InSight™ provides a unique and beneficial supplement to a traditional lecture-oriented class, and the feedback we have received from our students has provided ample support for this belief.□

CPR Certification Requirements for Clinics of Schools and Colleges of Optometry

W. Howard McAlister, O.D., M.A., M.P.H., Timothy A. Wingert, O.D.
and Thomas Jones, B.A.

Abstract

The directors of clinics of schools and colleges of optometry were polled regarding CPR certification requirements for faculty and student clinicians as well as nonprofessional staff. Only half of the respondents required students to be certified, about one-fourth required faculty to be certified, and none required certification of nonprofessional staff.

Key Words: CPR certification, clinics, schools of optometry, colleges of optometry

Introduction

Myocardial infarction is the leading cause of death in the United States. Every year approximately one and a half million people will experience a heart attack and approximately 540,000 of those people will die. Each year 350,000 victims die of myocardial infarction before reaching a hospital, the average person waiting three hours before seeking any help.[1] The greatest risk of death is in the first two hours following the onset of symptoms.[2,3] While it is impossible to estimate exactly how many lives could be saved if cardiopulmonary resuscitation (CPR) was provided promptly and followed by advanced cardiac life support, the American Heart Association (AHA) believes the mortality rate could be decreased by approximately 100,000 to 200,000 each year in the United States.[4] Communities with large numbers of laypersons trained in basic life support and with a rapid response system of well-trained paramedical persons have demonstrated that more than 40% of patients with documented out-of-hospital ventricular fibrillation can be successfully resuscitated if CPR is provided promptly and followed by advanced cardiac life support.[5] In the absence of prompt bystander-initiated CPR, however, successful resuscitation is unlikely[6]; thus the importance of CPR training cannot be underestimated.

Knowledge of CPR should be of special consideration in the health professions, and it is recommended by the AHA that all health professionals be CPR certified.[1] Optometry has evolved into a primary health care profession, and with that comes an even greater responsibility to the public. Optometrists currently screen for many systemic diseases and monitor and co-manage ocular manifestations of many of these conditions. The 1989 American Optometric Association Economic Survey showed that nine percent of the responding doctors of optometry have clinical privileges that allow them to provide eye care services in hospitals. Many of these facilities may require staff members to be CPR certified.[7,8] Currently all fifty states and the District of Columbia permit doctors of optometry

TABLE 1
Questionnaire

1. Do you require student clinicians to be CPR certified before they are allowed to participate in patient care?
2. If the answer to number 1 is yes, do you require them to maintain CPR certification once they are providing patient care in the clinic?
3. Do you require your non-professional staff (i.e. receptionists, secretaries, etc.) to be CPR certified at the time of their hiring?
4. If the answer to number 3 is yes, are they required to maintain their CPR certification?
5. Are the faculty who participate in patient care required to be CPR certified at the time of their initial appointment?
6. If the answer to number 5 is yes, are the faculty required to maintain their CPR certification?

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Dr. Wingert is assistant professor of optometry and director of the pre-clinical course sequence at the University of Missouri-St. Louis School of Optometry.

Mr. Jones is a fourth-year optometry student at the University of Missouri-St. Louis School of Optometry.

This paper was presented October 1, 1990, at the annual meeting of the American Public Health Association.

to use diagnostic pharmaceutical agents.[9] The use of therapeutic agents is also currently allowed in twenty-five states.[10] As with any pharmaceutical, these drugs have the potential to produce adverse systemic effects. It is therefore of even greater importance for the optometrist to be knowledeable in CPR. It is necessary for schools and colleges of optometry to set the example by ensuring the clinics that they operate have standards requiring their personnel to have appropriate training in the management of cardiopulmonary crises.

All directors of clinics at schools and colleges of optometry in the United States and Puerto Rico were polled in order to ascertain whether patient care providers and nonprofessional staff members at their facilities were required to be CPR certified.

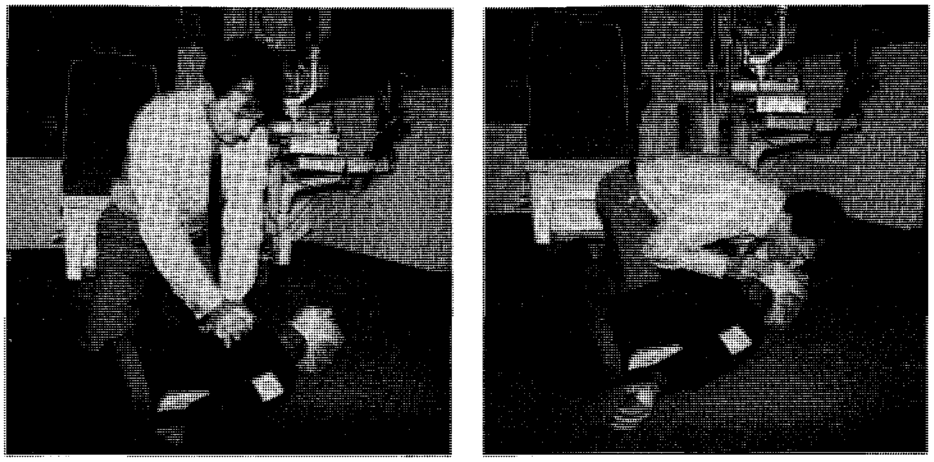
Methods

On November 9, 1989, a survey was sent to the director of clinics at each of the schools and colleges of optometry in the United States and Puerto Rico. The survey asked six questions regarding CPR certification requirements of both the nonprofessional staff and patient care providers, (Table 1). A 100% response rate was obtained with all surveys returned by February 1, 1990.

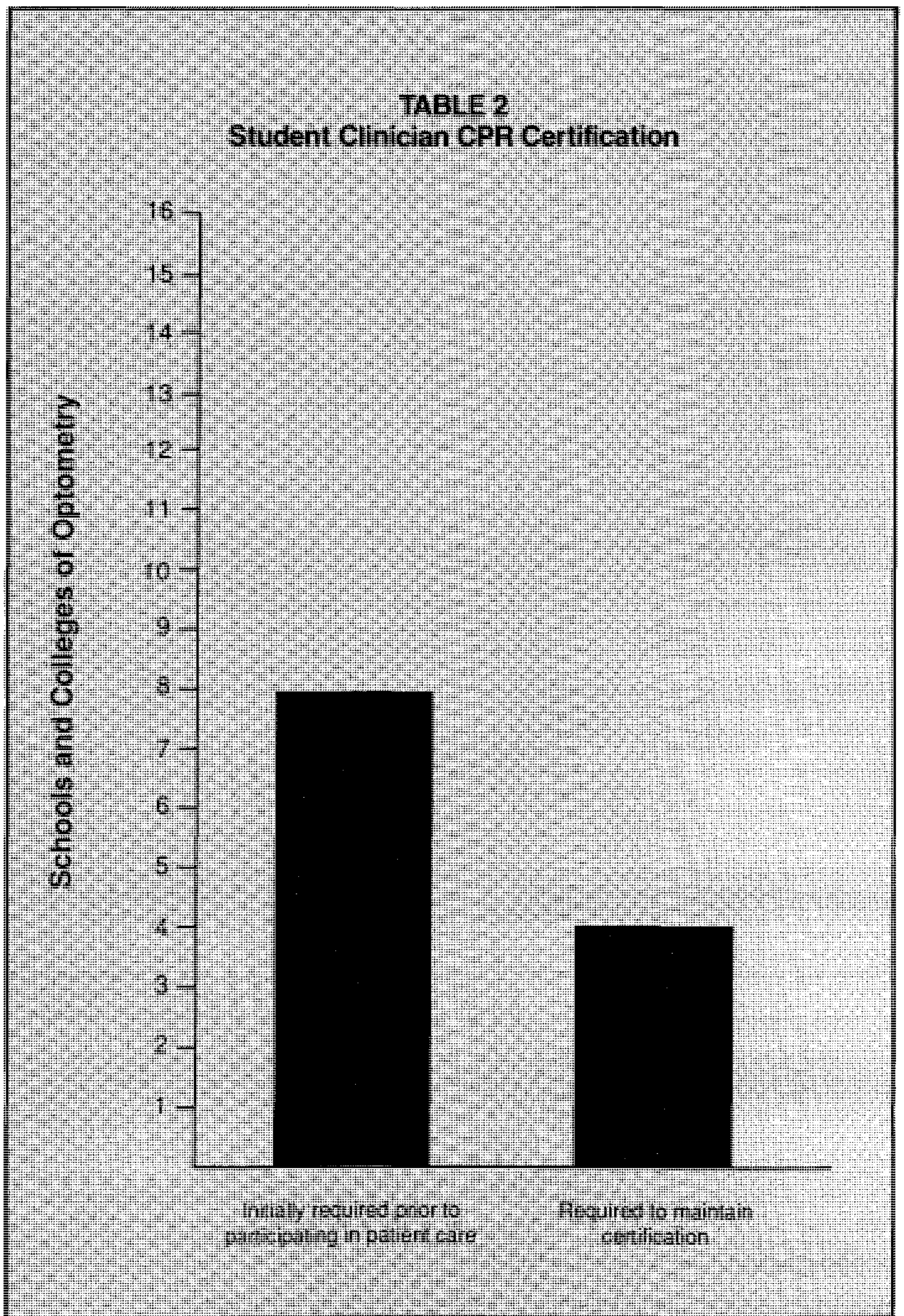
Results

Tabulation of the results showed that 50% (8/16) of the schools and colleges required that students entering into the clinical setting be certified in CPR. But of those who required it for students entering the clinic, only half (4/8) required that CPR certification be maintained (Table 2). Thirty-one percent (5/16) of schools and colleges required faculty to be CPR certified before their initial appointment. Of those five schools, only three (19%) required the faculty to maintain certification (Table 3). None of the schools and colleges required the non-patient care personnel or staff to be CPR certified.

However, these parameters will be modified due to a January 31, 1990, change in California state law requiring all licensed optometrists to be certified in CPR. This modification will result in a change in the number of schools' and colleges' faculty members requiring certification and maintenance of certification to 44% (7/16) and 31% (5/16) respectively.



Dr. Wingert demonstrates the CPR technique with the help of a dummy provided by the University of Missouri School of Optometry.



Discussion and Conclusion

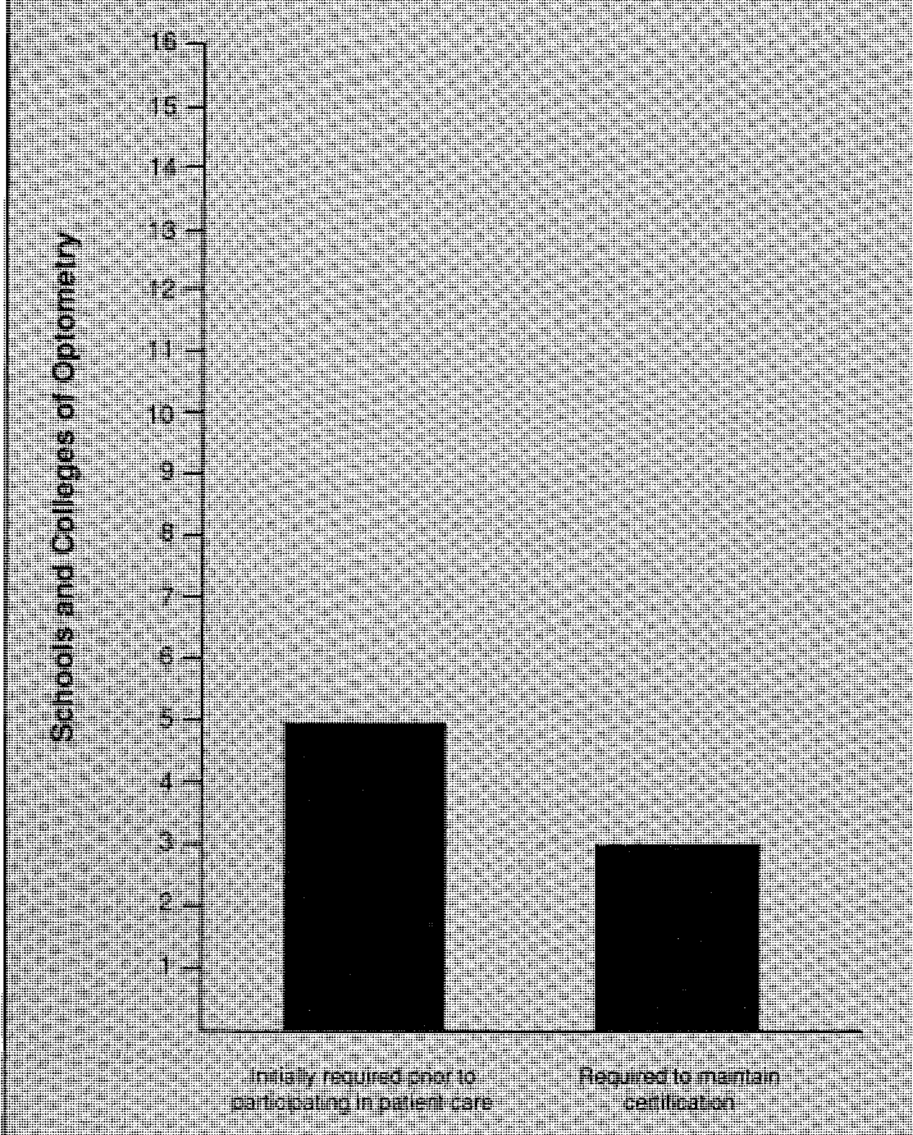
If mandatory CPR certification for clinic personnel is accepted as a reasonable requirement, it is evident that there is a deficiency in many optometric educational institutions. The American College of Emergency Physicians guidelines for undergraduate medical education include courses in CPR as part of their basic curriculum. A survey reported in the January 1986 Annals of Emergency Medicine showed that 96.2% of medical schools offer CPR instruction in their curriculum. Students are required to take the course in 85.9% of the schools, but only 53.3% require successful completion or certification for graduation.[11,12] Eighty-one percent of dental schools included CPR instruction in their curriculum as early as 1977.[13]

Throughout the United States, CPR is taught not only to other primary care professions but also to police, fire fighters, paramedics, and families of cardiac patients.[14] In many court decisions optometrists have been held to the medical standards of care and not to those of optometry.[15] This suggests further the appropriateness of optometrists being CPR certified, since physicians have a legal obligation to administer CPR.[16] Maintaining CPR certification is also important because CPR skills have been shown to deteriorate rapidly when not regularly used.[17,18]

As has recently been the case in California, several states have realized that doctors of optometry have the responsibility of being prepared to provide emergency care in the event of cardiopulmonary collapse.[19] Optometric educational institutions should improve their standards and take the lead on this very important issue. □

Acknowledgements: We thank Cheryl Cann for her assistance with the literature search.

TABLE 3
Clinical Faculty CPR Certification



References

1. Instructors manual for basic life support, American Heart Association, 1987, Dallas, 159.
2. Kuller L, Lilienfeld A, Fisher R. Sudden and unexpected deaths in young adults, An epidemiological study. JAMA 1966; 198(3): 248-252.
3. Pantridge JF, Geddes JS. Cardiac arrest after myocardial infarction. Lancet 1966; 1(7441): 807-808.
4. Instructors manual for basic life support, American Heart Association, 1987, Dallas, 1.
5. Eisenberg MS, Bergner L, Hallstrom A. Cardiac resuscitation in the community: Importance of rapid provision and implications for program planning. JAMA 1979; 241(18) 1905-1907.
6. Thompson RG, Hallstrom AP, Cobb LA. Bystander-initiated cardiopulmonary resuscitation in the management of ventricular fibrillation. Ann Intern Med 1979; 90(5): 737-740.
7. Accreditation Manual for Hospitals, Joint Commission on Accreditation of Hospitals, 1987, Chicago, 37, 66.
8. Bennett Irving. Yesterday's OD would hardly recognize the practitioner of the '90s, AOA News, Sept. 15, 1989, 9.
9. Classe' JG. 1989. Legal review: In the eyes of the law. Optometric Management Feb. 1990; 25(2): 57.
10. States renew TPA push. Review of Optometry Jan. 1990; 127(1): 8.
11. American College of Emergency Physicians: Guidelines for undergraduate education in emergency medicine. Annals of Emergency Medicine, 1980; 9:222-228.
12. Sanders AB, Criss E, Witzke D, Levitt MA. Survey of undergraduate emergency medical education in the United States. Annals of Emergency Medicine January 1986; 15(1): 20.
13. Cardiopulmonary resuscitation training in American dental schools and requirements for state licensure. Journal of Dental Education 1978; 42(5): 264-265.
14. Lorson EL, Osborn DB: Standardization of CPR training for the health professions. General Dentistry 1977 September-October; 42-43.
15. Classe' JG: Legal aspects of optometry, Butterworths. Stoneham, MA, 1989, 1st Edition, 44-46.
16. Instructors manual for basic life support, American Heart Association, 1987, Dallas, 165.
17. Weaver FT, Ramirez AG, Dorfman SB, Raizner AE. Trainee retention of cardiopulmonary resuscitation. JAMA, March 2, 1979; 241(9): 901-3.
18. Stross JK. Maintaining competency in advanced cardiac life support skills. JAMA June 24, 1983; 249(24): 3339-3341.
19. Wingert TA, McAlister WH, Gudmundson J. State board of optometry requirements for CPR certification for optometric licensure, J Am Optom Assoc 1990, 61(11): 848-850.

A Survey of Foreign Student Enrollment in United States Colleges of Optometry: 1989-1990

Arnold Katz, O.D.

Abstract

A survey of foreign student enrollment at United States colleges of optometry during 1989-1990 was conducted, and the results compiled in tabular form. Implications of this previously uncompiled data are discussed; in particular, the steady increase of Canadian nationals enrolling in United States colleges of optometry is noted.

Introduction

The purpose of this paper is to enumerate the foreign student population in United States optometry schools, and to offer new data relating to foreign optometry students studying in United States schools of optometry. To gather the data, a questionnaire survey of all United States schools was conducted, obtaining from them data on the foreign students they enroll. The 100% response rate means that the survey constitutes a complete census of the foreign optometry school population, providing an accurate picture of foreign study in optometric institutions in this country. The survey also included data on other categories of interest, such as countries of origin, distribution by school, academic programs offered, and entrance requirements for specific programs.

Such information is important for at least two reason: first, there is a continuing effort to establish the optometric profession as a recognized independent discipline internationally. The level of didactic and clinical training available in United States optometry schools is substantially more advanced than in most other countries. United States schools of optometry make a valuable contribution to world-wide optometry by offering opportunities to present and future foreign optometrists to elevate their knowledge and skills, thus expanding the cadre of international professional and educational leaders. An accurate and current ongoing data base will be helpful in recognizing trends and implementing strategies for program improvement; second, as the pool of traditional applicants to optometry schools continues to diminish, optometric education must look increasingly to nontraditional sources of appropriate students. Foreign students, both in standard four-year curriculum programs,

TABLE 1
Foreign Students Enrolled in U.S. Optometry Schools, 1989-90

SCHOOL	Four-Year OD Program	Advanced Standing for Graduates of Foreign Optometry Schools	Total
NEWENCO	22	10	32
Pacific Univ.	21	2	23
ICO	21	0	21
Univ. of Houston	11	4	15
Ferris State	5	1	6
PCO	5	1	6
Indiana Univ.	5	0	5
Univ. Calif.-Berkeley	5	0	5
SUNY	4	0	4
SCCO	2	0	2
Univ. of Ala.-Birmingham	1	0	1
Univ. of Mo.-St. Louis	1	0	1
Northeastern State-Tahlequah	0	0	0
Ohio State Univ.-Columbus	0	0	0
Southeastern Univ.	0	0	0
SCO	0	0	0
TOTAL	103	18	121

A foreign student is anyone enrolled for courses in the U.S. who is not an immigrant (permanent resident) or a citizen. This does not include resident aliens (holders of "Green Cards").

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and in optometric advanced standing programs, should be looked upon as valuable resources.

The Association of Schools and Colleges of Optometry has compiled annual surveys of enrollment at United States optometric educational institutions. (Prior to 1985, the surveys were compiled by the Council on Education of The American Optometric Association). Included in these surveys are listings of Canadian and non-Canadian foreign nationals enrolled. To date, however, these surveys have not investigated countries of origin, distribution by school, academic programs offered, and specific entrance requirements for varying programs.

Methods

Survey questionnaires were sent to the sixteen optometry colleges in the mainland United States (see Appendix). Data on three programmatic areas were requested: (1) foreign students enrolled in standard four-year Doctor of Optometry programs, (2) foreign trained optometrists enrolled with advanced standing to Doctor of Optometry programs, and (3) foreign trained optometrists enrolled in special emphasis non-degree concentrations of coursework. For the purpose of the study, a foreign student was defined as anyone enrolled for courses in the United States who was not an immigrant (permanent resident) or a citizen. Refugees were included, but resident aliens (holders of "green cards") were excluded.

Results

The survey results have been tabulated, and are summarized in Tables 1 and 2.

The number of foreign students enrolled in U.S. schools of optometry increased from 47 in AY 1977-78, representing 1.1% of the total enrollment, to 121 in AY 1989-90, which represented 2.1% of total enrollment.[1] By comparison, foreign students accounted for 2.7% of enrollments in all institutions of higher learning in the United States in AY 1988-89.[2] A notable trend during this period has been a rapid increase in the number of Canadian students enrolled in United States schools of optometry.

Figure 1 shows that Canadian students represented 54.5% of all foreign enrollment in AY 1989-90, as compared with 19% in AY 1977-78.

Discussion

Optometric practice in Canada, in contrast with medicine, is relatively unfettered by government regulation at this time. As the demand for optometric vision care increases, qualified and motivated students who are experiencing difficulty obtaining entry into optometry schools in Canada are turning to United States schools in increasing numbers.

In AY 1989-90 there were no reported foreign optometrists enrolled in special emphasis non-degree programs. It would appear that an important motivation for foreign students and applicants to study in the United States is the availability of the Doctor of Optometry degree. Of the reported total of 121 foreign students, 18 (14%) were foreign trained optometrists enrolled with advanced standing to Doctor of Optometry programs, and 103 (86%) were enrolled in standard four-year Doctor of Optometry programs.

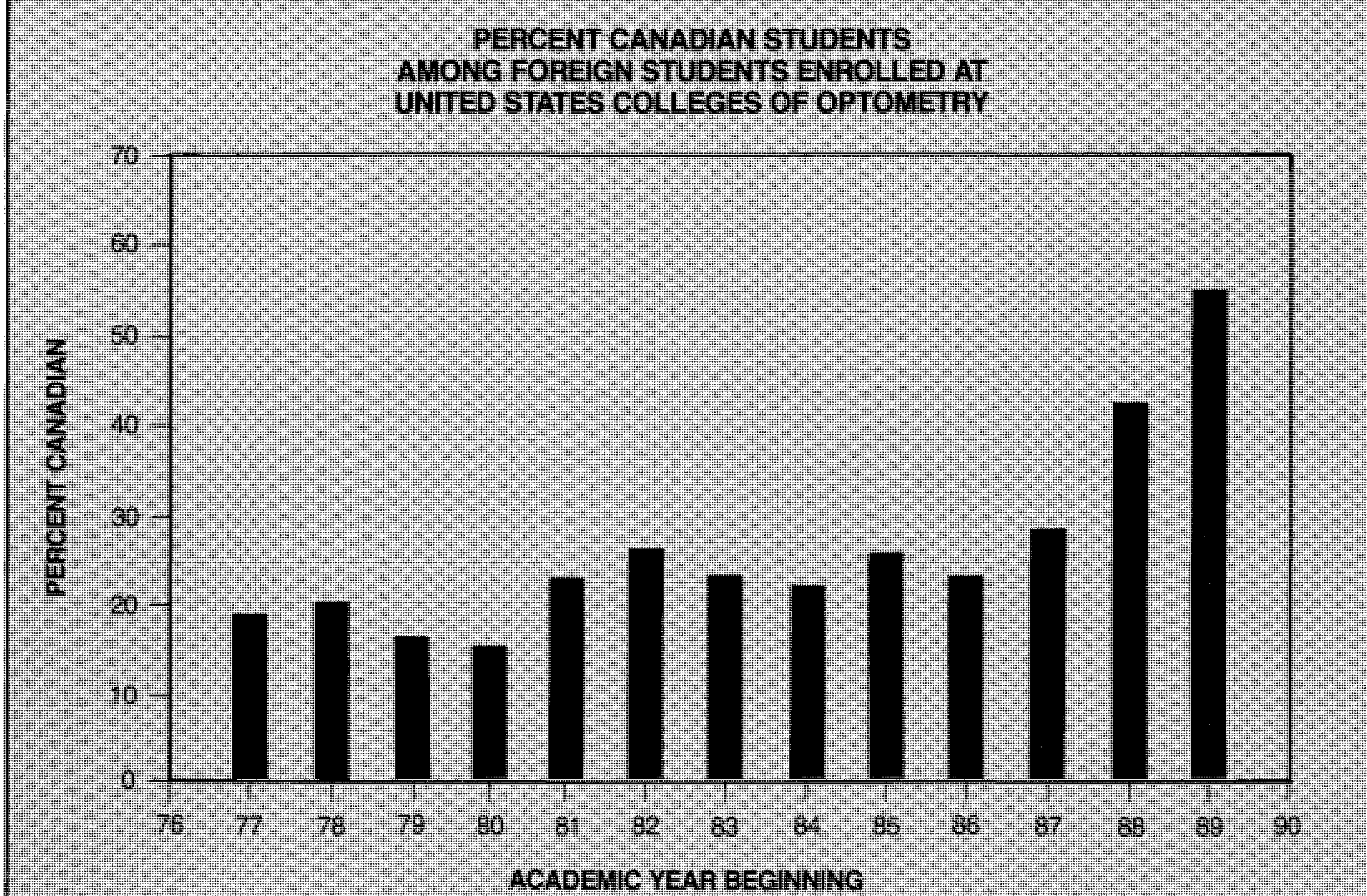

Figure 1

In the four-year programs, the countries with more than two enrolled students were Canada (65), Iran (6), Taiwan (4), and Bahamas (3). The relatively high number of Iranian students enrolled probably resulted from the large increase in Iranian undergraduate students at United States undergraduate institutions in the '80s. In AY 1988-89, more than half of the foreign students in the United States came from Asia. During that year, eight of the top ten sending countries or places of origin for all institutions of higher learning in the United States were in Asia; the two exceptions were Canada and Iran.[2] Countries with more than two optometrists enrolled with advanced standing in Doctor of Optometry programs were South Africa (7) and England (3). It would appear that this program is particularly attractive to optometrists trained in English-speaking systems, perhaps based on the fact that the higher level of optometric education in these countries produces more optometrists eligible for such a program.

Three schools of optometry, The New England College of Optometry (22), Pacific University (21), and Illinois College of Optometry (21), report the largest enrollment of foreign students in four-year O.D. programs. Among schools admitting foreign trained optometrists with advanced standing to Doctor of Optometry programs, those reporting the largest enrollment were The New England College of Optometry (10), University of Houston School of Optometry (4) and Pacific University School of Optometry (2).

All schools accepting foreign students in four-year O.D. programs have the same admissions requirements as for United States students. Requirements vary for admission with advanced standing to Doctor of Optometry programs; with one exception, all schools offering advanced standing programs require a prior degree, with prerequisite course work. The New England College of Optometry is the only school which requires a minimum of two years of verified full-time optometric clinical experience post graduate. One school, Illinois College of Optometry, accepts only South African students in this program. Southern California College of Optometry requires that advanced standing optometrists must meet the same requirements as all regular students, including Optometry Admissions Test, and credit is awarded for prior optometry work, provided the coursework is equivalent and the applicant

TABLE 2
Foreign Students Enrolled in U.S. Optometry Schools, 1989-90
Home Countries

	Four-Year OD Program	Advanced Satnding for Graduates of Foreign Optometry Schools	Total
Canada	65	1	66
Iran	6	1	7
South Africa	0	7	7
Taiwan	4	0	4
China	2	2	4
Bahamas	3	0	3
England	0	3	3
Jamaica	2	0	2
Kenya	2	0	2
Korea	2	0	2
Malaysia	2	0	2
Netherland Antilles	2	0	2
Zambia	2	0	2
Philippines	1	1	2
Aruba	1	0	1
Brazil	1	0	1
Egypt	1	0	1
India	1	0	1
Israel	1	0	1
Libya	1	0	1
Nigeria	1	0	1
South Korea	1	0	1
Syria	1	0	1
Venezuela	1	0	1
Peru	0	1	1
Switzerland	0	1	1
Tanzania	0	1	1
TOTAL	103	18	121

TABLE 3
Foreign Students Enrolled in U.S. Optometry School, By Year

Academic Year	Canadian	Other	Total Enrollment
1977-78	9	38	4210
1978-79	9	37	4436
1979-80	8	41	4502
1980-81	5	28	4542
1981-82	9	30	4541
1982-83	15	43	4561
1983-84	14	47	4539
1984-85	12	43	4460
1985-86	16	48	4209
1986-87	18	61	4494
1987-88	23	58	4509
1988-89	41	57	4576
1989-90	66	55	4683

NOTE: 1977-1989 data derived from ASCO "Annual Survey of Optometric Education Institutions."
1989-1990 data derived from "Annual Census of Foreign Optometry Students," The New England College of Optometry.

passes a faculty administered examination.

Conclusion

As optometry strives to expand in scope and parameters of responsibility in the United States, similar efforts are underway to establish optometry as a recognized independent discipline internationally.

Baldwin[3] suggests that United States optometric institutions can best serve the cause of international optometry in two ways: one, by providing faculty support and advice to optometric institutions in countries where the optometric organization is exercising efforts to improve its independent standing; and, two, by providing graduate and special professional education to present and future faculty members of these institutions.

Changes in the scope of practice and optometric education have spurred the American Optometric Association into a more appropriate definition of optometry, stating in part that "optometrists diagnose and treat diseases of the visual system." United States optometry schools can make a valuable contribution to the advancement of optometry world-wide by offering increased opportunities for optometrists trained in other countries to elevate their knowledge and skills, thus contributing to the cadre of international professional and educational leaders. □

References

1. Annual Survey of Optometric Educational Institutions, compiled annually, 1977-1984, Council on Education, The American Optometric Association, 1984-1989, Association of Schools and Colleges of Optometry.
2. The Annual Census of Foreign Students in the United States, Open Doors, 1988-1989. In: Report on International Exchange New York: Institute of International Education: 1..
3. Baldwin WR. Optometry world-wide: an educator's perspective. Journal of The American Optometric Association 1984 55(9): 677-680.

APPENDIX

THE NEW ENGLAND COLLEGE OF OPTOMETRY
ANNUAL CENSUS OF FOREIGN OPTOMETRY STUDENTS,* 1989/1990

CENSUS REPORTER

School:
Name:
Title:
Address:
City: State Zip
Telephone:

A. TOTAL FOREIGN STUDENT ENROLLMENT, AY 1989-1990 ______

B. FOREIGN STUDENT ENROLLMENT, BY PROGRAM TYPE:

I. FOUR-YEAR OD PROGRAM NUMBER OF FOREIGN STUDENTS ______

HOME COUNTRY NUMBER NUMBER

ADMISSIONS REQUIREMENTS—FOUR-YEAR OD PROGRAM
SAME AS U.S. STUDENTS? ______
DIFFERENT THAN U.S. STUDENTS? ______
(IF "DIFFERENT," PLEASE SUMMARIZE DIFFERENCES):

II. ACCELERATED OR ADVANCED STANDING PROGRAM FOR GRADUATES OF FOREIGN OPTOMETRY SCHOOLS
NUMBER OF FOREIGN STUDENTS IN PROGRAM ______
HOME COUNTRY—ADVANCED STANDING PROGRAM:
NUMBER NUMBER

ADMISSIONS REQUIREMENTS—ADVANCED STANDING PROGRAM
PRIOR DEGREE REQUIRED? □ YES □ NO
IF "YES," PLEASE SPECIFY: ______

PREREQUISITE COURSEWORK? □ YES □ NO
IF "YES," PLEASE SPECIFY: ______

CLINICAL EXPERIENCE REQUIRED? □ YES □ NO
IF "YES," PLEASE SPECIFY: ______

III. NON-DEGREE COURSEWORK
NUMBER OF FOREIGN STUDENTS IN PROGRAM ______
HOME COUNTRY NUMBER HOME COUNTRY NUMBER

ADMISSIONS REQUIREMENTS—NON-DEGREE COURSEWORK
PRIOR DEGREE REQUIRED? □ YES □ NO
IF "YES," PLEASE SPECIFY: ______

PREREQUISITE COURSEWORK? □ YES □ NO
IF "YES," PLEASE SPECIFY: ______

THANK YOU FOR YOUR COOPERATION!
PLEASE RETURN THIS QUESTIONNAIRE TO: Arnold Katz, O.D.
Director of International Admissions, The New England College of Optometry
424 Beacon Street, Boston, Massachusetts 02115 (617) 266-2030

Fitting Guide for Rigid and Soft Contact Lenses: A Practical Approach, Harold A. Stein, Bernard J. Slatt, and Raymond M. Stein, The C.V. Mosby Company, St. Louis, 3rd edition, 1990, 613 pages, 713 illustrations, hardbound, $57.95.

This textbook is primarily written as a manual for the fitting of contact lenses. As such, it assumes that the reader knows very little about contact lenses. The fitting of soft and rigid lenses is described through the use of numerous tables and fitting systems. It offers a good description of the history of soft lenses, a list of advantages and disadvantages of soft lenses, and general guidelines for fitting them. The description of care systems described for soft lenses is quite good. This text does not go into great detail in the fitting of specialty lenses, such as bifocal and keratoconic designs; however, the coverage of these subjects is handled quite well. The chapters on bandage lenses and on problems associated with current care systems are particularly good. There is also an excellent chapter covering the effect of cosmetics on contact lenses. By apparent design, there is little information about the physiology of the ocular structures involved in contact lens wear, with the notable exception of a particularly extensive section on the tear film.

The format of this textbook is somewhat different from other contact lens texts. Complications of contact lenses are, for the most part, covered together in several chapters at the end of the book and are divided into anatomical categories and pathological entities. The fitting of lenses is covered in tables and numbered statements. An interesting concept is a chapter that discusses problems associated with contact lens wear through the use of case examples.

There are some things that may limit the usefulness of this book. There are minor errors throughout the book, none of which may create serious problems for the doctor who doesn't recognize them as errors, but nevertheless these mistakes are generally not expected in a text of this magnitude. The illustrations and photographs are not particularly helpful, and the color plates are not well reproduced. The fitting of rigid lenses is described in such a way as to leave the impression that fitting philosophies need to be tailored to the material being used, e.g., PMMA, silicone/acrylates, and fluorinated silicone/acrylates. The description of fitting bitoric lenses and their power determination is not well done. For a text of this size, there is a remarkably short list of references which is at the end of the book rather than associated with each chapter.

In summary, this text may be useful for the contact lens fitter interested in a "manual" type approach. It serves this purpose well. However, for the more experienced doctor or a student, its limited discussion of background information, physiology, and mechanisms of how lenses work may limit its usefulness.

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The Vitreous and Vitreoretinal Interface, Charles L. Schepens and Adolphe Neetens (Eds) with 17 contributors, Springer-Verlag, New York, 1987, Hardbound, 315 pp., 122 illus., 42 in color, $71.50.

The role of the vitreous humor in retinal disease has assumed increasing importance in the last 20 years due to improved diagnostic and therapeutic measures that have become available through advancing technology. So it is appropriate that this interesting specialty text entitled *"The Vitreous and Vitreoretinal Interface"* has become available.

Written in the familiar "multiple author" style, this text is a small compendium of chapters covering vitreous and vitreous pathology in a well organized fashion. The chapters address the topic of vitreous from the viewpoint of embryology, anatomy, biochemistry, clinical examination, pathology and clinical management. Most chapters are well illustrated with ample use of color plates. The material presented is well referenced, especially in terms of the classical literature, thus making this book an excellent source.

While the authors are generally thorough in most of their contributions, the chapter on clinical examination leaves much to be desired. There is only a limited amount presented regarding "indirect" biomicroscopic methods of vitreous examination and the uses of modern ultra-wide field contact lenses is not touched upon at all. This is not to say that the overall significance of this text is diminished by this difficulty. Excluding the clinical examination portion, *The Vitreous and Vitreoretinal Interface* is a valuable contribution to the literature and will assist the educator and serious student in this important area of eye pathology.

Manual of Fundus Fluorescein Angiography, Amresh Chopdar, FRCS, Butterworths, London, 1989, 134 pp., hardbound, illus., many in color, $72.00.

Although limited in its scope, *Manual of Fundus Fluorescein Angiography* is a delightful text on this important subject. The opening chapter covers the methods, complications and general interpretation of angiograms. Following chapters deal with the uses of fluorescein angiography in specific retinal diseases, including vascular disease, macular disorders, choroidal diseases, tumors, nerve head problems and diabetic retinopathy.

Appropriate to the subject, this book is composed mostly of retinal photos and angiograms. Text is limited to brief descriptions of the fluoresceins and their interpretations. There is no discussion of the management of the conditions, but rather the author focuses strictly upon the diagnostic considerations. There are no chapter references although there is an extensive additional readings section at the conclusion of the book.

While it is not an in-depth treatise, the reader will be pleased with its photographic value and will be able to quickly review this text and rapidly become familiar with the methods and interpretation of angiograms for a wide variety of retinal vascular diseases.

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