



20/20 Vision Today

Issue 13

A Newsletter from Drs. Jeanette Lee, Cynthia Truong and Auna Rajagopalan

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Visual Learning

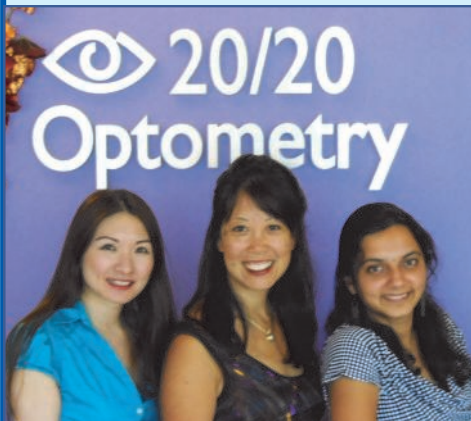
Here it is, the start of the school year, when children are supposed to begin learning again. But, in reality, learning is a daily activity stretching from birth to death.

In this issue we begin a two-part series looking at vision and learning. The first part explores why pictorial information makes fuller use of the body's ability to perceive, and how information visualization makes it easier to rapidly assimilate data.

In the next issue, we will look at how undetected visual problems can reduce the ability to learn, in school and at work, and may lead to incorrect diagnoses of learning disabilities.

We hope you find this information interesting and helpful in speeding up your own learning and that of those who depend on you.

Drs. Lee, Truong and Rajagopalan



art Card, Jock Mackinlay and Ben Shneiderman, three pioneers in the field of human-computer interaction, in their book *Readings in Information Visualization: Using Vision to Think*. "We try to make our ideas 'clear,' to bring them into 'focus,' to 'arrange' our thoughts. Whatever the activity, mental work and perceptual interactions of the world are likely to be interwoven."

From Movable Type to Motion Pictures

Man is a visual creature. The moment an infant first opens its eyes, it begins the lifelong process of visual learning. Six million color receptors (cones) in each eye provide detailed information of the world around us in 10 million hues. The eyes' 100+ million black and white sensors (rods) let us obtain basic information even when light levels are 1 billionth that of bright sunlight.

Information is also relayed from one person to another visually, from the cave painting depicting hunts, to hieroglyphics telling tales of Egyptian monarchs, to the stained glass windows in cathedrals used to teach about the saints. Trades were learned by observing a master in action.

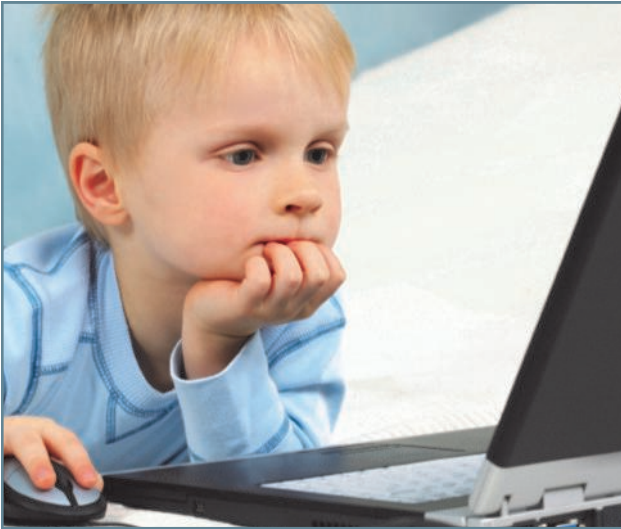
"To understand something is called 'seeing' it," wrote Stu-

The invention of the printing press, together with the use of paper instead of velum for books, brought written text to the masses for the first time. Books were portable and relatively low cost, allowing knowledge to be transmitted around the world and across the centuries. Over the next five hundred years the written word came to dominate the transfer of knowledge, the manual replacing the master. But with the invention of photography, followed by the film, television, video and digital technology, pictorial representations are again becoming the preferred way to communicate. Facebook hosts about 100 billion photos and people watch 3 billion YouTube videos per day. You can drop by

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Visual Learning



eral skills, people need to interact with data. Staring at a spreadsheet or a database printout doesn't convey the data in a way that aids decision making. It requires tools that convey information in a way that is easily grasped and can be acted upon.

1980 through 2009. By using a visualization tool, he is able to take 120,000 statistics and clearly present them in a way that tells a compelling story. (See sidebar for other examples.)

The Human Element

Information visualization is designed to make the most out of the abilities of the eyes.

"Information visualization is clearly dependent upon the properties of human perception," wrote Card, et al. "It is the job of information visualization systems to set up visual representations of data so as to bring the properties of human perception to bear."

To get the most out of information visualization, the eyes themselves also need to be healthy and working properly. Unfortunately, the eyes were not designed to be staring at a computer screen all day. Sore, dry, blurry eyes are a barrier to receiving visual information. In the next issue we will look at how to select and properly set up a monitor and how to keep eyes healthy when working on a computer.

(Continued from page 1)

iTunesU and view Paul Hilfinger's Fall 2011 Computer Science lectures at Berkeley or visit AdobeTV to learn website design.

But, in addition to learning gen-

Visualization Software

Here are a few examples of visualization software developed or influenced by the people referenced in the main article. You can visit these sites for demonstrations of the software in action, or download trial software to use on your own spreadsheets and databases.

Gapminder.org—An organization cofounded by Rosling that contains databases of 500 global development indicators such as population, wealth, longevity and educational levels. Visitors can create their own bubble charts using any of that data, or download the software for their own use.

Tableau Software offers desktop, server and web-based visualization software. Users can drag and drop columns or fields from spreadsheets and databases to explore their interaction.

TIBCO Spotfire is an information visualization and data analysis tool. Users can access and manipulate data through a web browser.

The Hive Group's software presents data in the form of a series of boxes of different size and color signifying their characteristics. Clicking on a box brings up detailed information.

Viewing Visualization

To quickly convey massive amounts of raw data, it is necessary to convert that data into visual information. Man doesn't just see text, but also colors, sizes, shapes, motion, spatial relationships and other visual clues.

"Information Visualization is particularly useful for monitoring large amounts of data in real time and under time pressure to make decisions," wrote Card, et al.

The best way to understand information visualization is to see it in action. Perhaps the best quick introduction is to watch the Swedish professor Hans Rosling's video *200 Countries, 200 Years, 4 Minutes* on YouTube. In that video, Rosling shows the interrelationship between income and lifespan has changed in each of 200 countries, year by year, from



A single image can convey the same data as a stack of printouts.



Meet Dr. Truong

Dr. Cynthia Truong was born in Vietnam and moved to the Bay Area when she was five. She learned early on the value of good eye care.

“I have needed glasses since I was really young and know the frustration of not being able to see,” she says.

The problem wasn’t diagnosed, however, until junior high. Up to that point, she had always preferred to sit in the front of the class, but when she was assigned seating at the back of the room, her grades dropped. A trip to the optometrist sorted that out.

“The doctor said, ‘this girl needs to see, she needs glasses,’”

she says. “Once I got them, my grades went back up.”

Dr. Truong decided to make it her life’s work to let others experience the same benefits she had. After graduating from U.C. Davis, she did her doctoral studies at the Southern California College of Optometry. Returning to the Bay Area with her husband, a software engineer at Apple, she started working in our office two days a week.

“I enjoy the interactions I have with my patients while providing them with quality eye care,” she says. “Every patient is unique, so I customize my treatment towards their specific visual needs.”



She particularly enjoys the reaction she gets from new patients.

“They think the world they see is normal,” she says. “I love their look of amazement when they try wearing glasses for the first time.”

Comprehensive Exam vs. Vision Screening



Schools and primary care physicians often perform vision screenings on students and adult patients. While these tests can detect some issues, they still miss many types of vision problems.

Vision screening programs typically just test for distance vision, which doesn’t tell whether someone has trouble focusing on reading material or a computer screen. In addition, those conducting the tests may lack the specialized training needed to diagnose vision problems.

To fully detect any eye or vision problems, it is essential to receive a comprehensive examination. According to the American Optometric Association (AOA), such examinations can only be conducted by an optometrist or ophthalmologist and should include the following actions:

- A review of the patient and family health history, including general health problems, medications taken and occupational or environmental conditions that may affect vision.
- Visual acuity measurement: how clearly each eye is seeing.
- Tests of depth perception, color vision, eye muscle movements, peripheral vision and response of the pupils to light
- Assessments to determine the presence of nearsightedness, farsightedness or astigmatism.

- Evaluation of eye focusing, eye teaming and eye movement abilities. It takes twelve different muscles working together to move the eyes across a line of text.
- Examination of the parts of the eye to ensure they are healthy.

The AOA recommends that people with good vision receive their first examination at six months of age, one at three years, before first grade and then every two years until age 60, when they should receive annual examinations. Those with known vision problem, or who are at risk, require more frequent exams.





What Our Patients are Saying

Second-grader Tatiana enjoys singing, but had trouble reading the words of the songs posted on the wall at her church. Two months ago she came into our office with her mother. Dr. Rajagopalan performed the eye exam and Shaun helped her pick out a pair of glasses. Here is what she has to say about her visit to our office and her new eyewear:

I like to sing, but at church I couldn't see the words to the songs. I didn't know what they said because I couldn't see from far. Something was wrong so my mom brought me to see the eye doctor.

Dr. Raj was nice. There was a fun test with green dots that I got to do that I didn't get to do before.

Then I got to have fun with Shaun while my mom's eyes were being tested. Shaun helped me pick out my new glasses. They are black on the outside and have red hearts and flowers on the sides as the design. They are pretty and I liked the design which is why I picked them.

Now that I got my glasses I am happy that I can see better. I like school a lot. I like my teacher and I have a lot of friends.

I just need my glasses to see things that are far away, not to see



Tatiana with our stylist Shaun.

up close. Having glasses makes it easier at school so I can learn more and I can see things at church now. I also wear them sometimes when I go watch San Francisco Giants games.

OOPS —THERE'S A TYPO

We have hidden a typo in our newsletter.

When you find the mistake, email us at info@2020eyesonline.com to be entered in a drawing to

Win Two Movie Tickets.

Congratulations to last issue's winner!



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Like us on Facebook
- 20/20 Optometry of
Silicon Valley -
for details on our
November eyewear party
and other specials offers.

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Comfortable New Contacts

The Duette Multifocal is a new type of hybrid contact lens which combines the comfort of soft contacts with the clarity and stability of rigid contacts. These bifocal lenses give excellent distance, computer and reading vision. To celebrate the release of these lenses we are offering:

**\$100 off the
normal fitting fee**

Usually \$299, just \$199 when you mention this offer.

Eyewear Party Wed. November 9 5 PM to 9 PM

Join us for
appetizers
and cocktails

Try on new styles by
TC Charton
and Serengeti

RSVP to Shaun at
shaun@2020eyesonline.com
or call 408-433-0800.