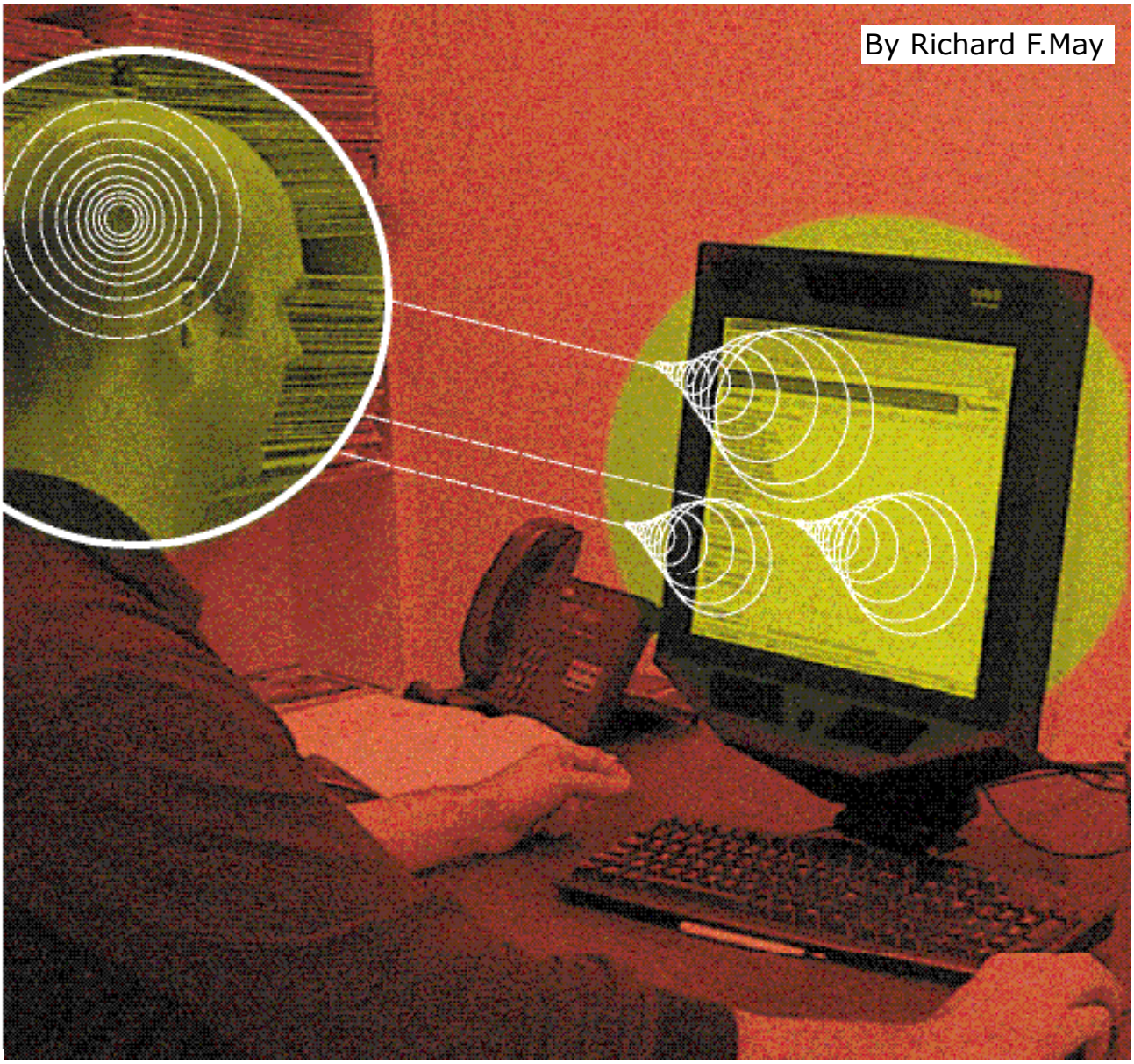

By Richard F.May

eye of the buyer

Researchers plumb the consumer psyche with improved eye-tracking and analysis.

What really goes on in the consumer's mind? Market researchers, of course, would just love to know. The challenge is that verbal responses to questions often barely touch the surface of what researchers need to know. It's the eyes, rather than the mouth, that really have a story to tell. Now the tools are becoming available to read that story directly.

Eyegaze, or eye-tracking, technology has reached the level of accuracy, portability and price that makes it viable for commercial use.

According to noted medical writer Rita Carter, author of Exploring Consciousness (University of California Press, 2002) and Mapping the Mind, (2000), people shown a picture concentrate on just five or six points within it. This implies that in cities such as Tokyo or New York, which are crowded with competing visual messages, only a handful of the most appealing images get any attention.

The promise of eye-tracking technology is that producers will be able to meet the genuine, unspoken needs of consumers. The broader field of eye-movement research ranges from

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IMAGE FROM *EXPLORING CONSCIOUSNESS*, BY RITA CARTER
INSET PHOTO COURTESY (FROM LEFT): APPLIED SCIENCE LABORATORIES / EYETECH DIGITAL SYSTEMS INC.

correction of vision problems and reading disorders, to military systems that help helicopter pilots maneuver in battle. Medical applications have been around for some years, but their use demanded extreme skill levels. A new generation of eye-tracking equipment for marketing applications can be used without an advanced degree in software development or optics and without a huge research budget.

"The activity of the brain is expressed in part though eye activity and mental states," says Keio University professor Takahiko Fukuda, who is director of the Japan Ergonomics Society and is well versed on the validity of this technology for understanding mental states. "The degree of awareness when looking at something can be measured and turned into numerical data which is extremely useful in cognitive research. Eye-gaze technology is a recent extension of earlier work and an adaptation for the business field."

Deeper meaning

So, by recording and analyzing eye movements and trace patterns, marketers and designers hope to learn more about what consumers really want, deep down inside.

In daily life we know when someone is paying attention to us or to some other object by their eye and head movements. The duration and intensity of a gaze can signal attraction, concern, interest or worry.

Eye movements can be extremely fast and fixations on any given point very brief. Medical researchers tend to be interested in the rapid (under 100 milliseconds) twitches of the eye that occur between each fixation. Marketers are more concerned with the general eye-gaze path across a scene (the track) and fixations.

Some researchers into human consciousness believe that fixation points are where important cognition or thinking occurs. Marketing researchers, using eye-gaze systems on consumers, take this logic a step further. They deduce that fixations

An old master through modern eyes. White trace lines indicate eye movement. Circle size is proportional to fixation time. Inset: A keyboard-mounted sensor collects data from the eye as it scans the screen / Eye-tracking apparatus for business use is less cumbersome than its medical precursors.

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"We realize that eye-tracking technology will be **controversial**, so we want to have public dialog."

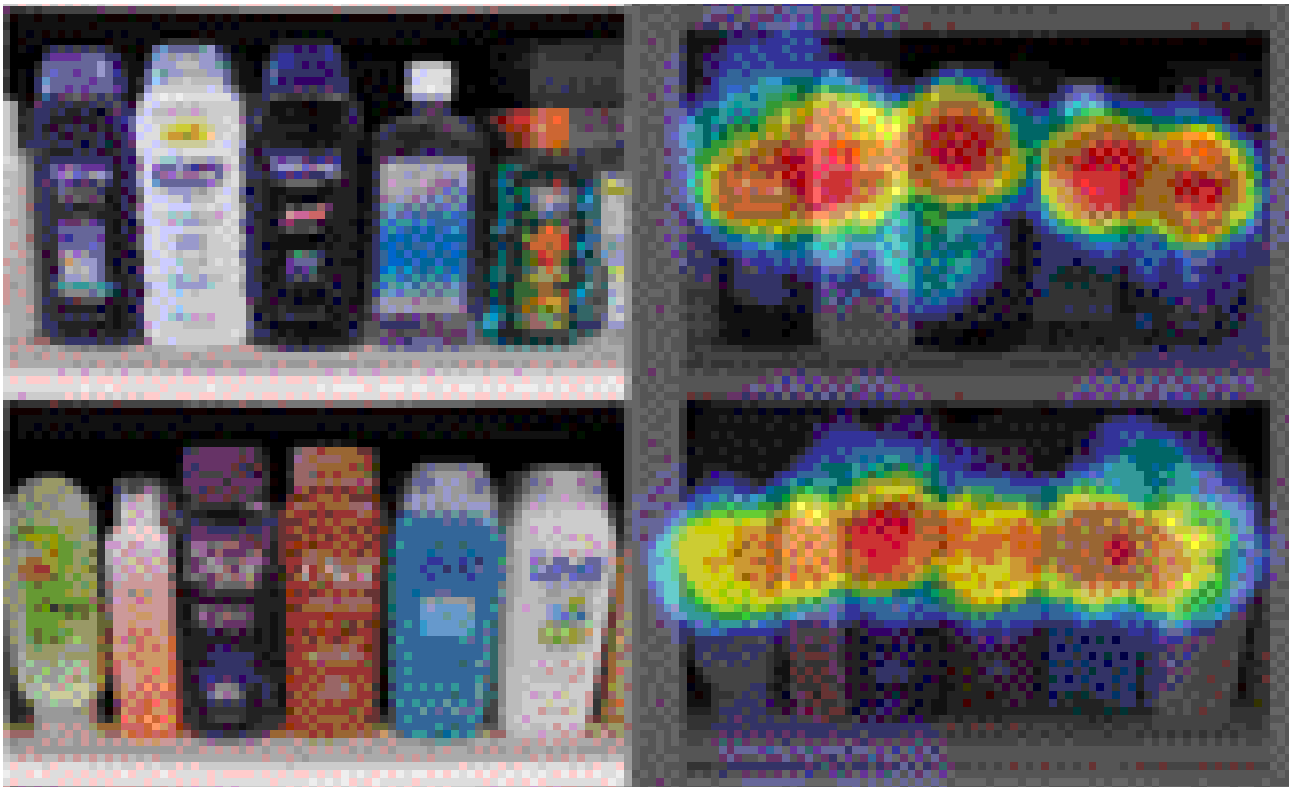

IMAGE COURTESY EYETOOLS INC.

and the eye track point directly to likes, dislikes and preferences.

The eye of the shopper

Scanning rows of hair-care products on a supermarket shelf, a shopper begins with a broad view of the shelf, then the head and eyes shift toward particular areas, then onto specific items. The eyes align the object of greatest interest in the center of the retina. Eye-gaze systems can determine to within as little as five millimeters the point on a computer screen where the eyes have focused.

The traditional approach to researching the preferences of consumers has been to simply ask them. In focus groups and one-on-one interviews, people are asked what they would happily use, what would they like to see in a product or whether they like the design and color of a new package. However, cognitive researchers have long known that the act of putting a subject in a test setting or asking a set of questions on a particular object tends to direct the subject's attention toward that object. The interviewee's attention is directed and shaped by the interviewer.

The problem is that in everyday situations we definitely do not attend to all the objects around us. To do so would result in sensory overload. Instructions can skew the data, even with eye-gaze equipment. When asked to view a Web page and to report what is of interest on the page, a viewer's eye is very active, exploring all corners of the page. But, in a passive experiment without guidance from the researcher, overall eye activity is much lower and only the most prominent features are noticed.

Consumer research focuses on several areas of eye movement: (1) the scan pattern that the eyes trace across a general scene, indicating what features are noticed first, second and so forth; (2) dwell time, the amount of time spent looking at specific areas; (3) latency, the lapse of time between the presentation of an image and

Data collected through a head-mounted eye-tracking system shows how a shopper scans products on a supermarket shelf.

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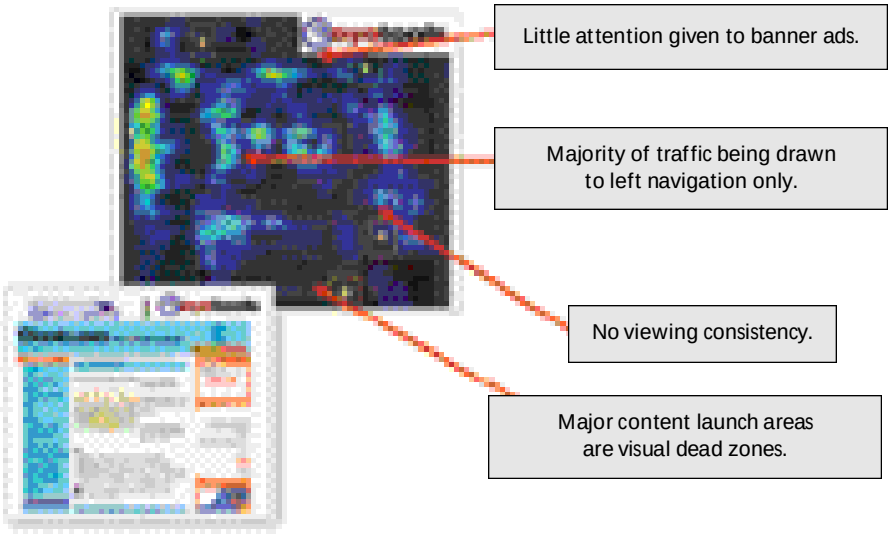
Marketing and advertising organizations have only just begun to **explore the benefits** of eye-gaze technology.

the time for it to be noticed by the subject; and (4) fixations, the number of times the subject's eyes change from one region of the scene to another area.

How is the tracking of the eye actually done? It is a combination of software and hardware, including an LED that shines a faint infrared light into the subject's pupil to create what is called the "bright pupil effect." Image-processing algorithms are used to recognize the pupil, locate its geometric center and other key eye parts and to dynamically adjust for head movement and individual eye differences.

Development of systems in the medical field strove for a high degree of accuracy. This meant the use of cumbersome headgear, time-consuming calibration processes and hefty computing power.

Consumer-related applications are less sophisticated, yet are still able to obtain a wealth of information. The new generation of eye-gaze gear for business applications may use a lightweight headset, perhaps mounted on a baseball cap. Or, for testing of stationary subjects, seated before an LCD display, there may be no external attachments at all. Systems currently in use for such tasks as package design, Web-page layout and ad positioning work simply by showing the viewer a series of on-screen images.



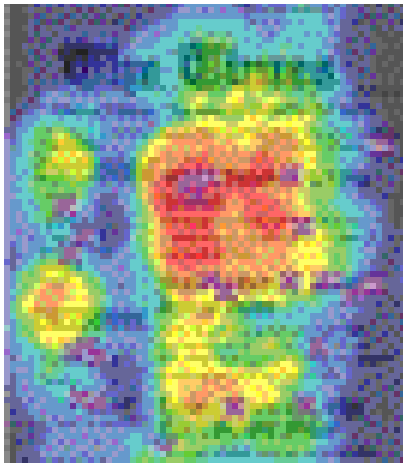
Though eye movements have always been regarded as revealing, major marketing and advertising organizations have only just begun to explore the benefits of eye-gaze technology. They are finding numerous ways of getting inside the consumer's head. Areas of impact include Web-content analysis, package design, advertisement positioning, magazine layout, newspaper headline and column markup, and logo placement for corporate branding programs. The market-research units of on-line stockbroker E*Trade Financial Corp., auctioneer eBay, search engine Yahoo.com and Microsoft Corp. are some of the early adopters of the eye-gaze approach.

Most new technologies over-promise and under-deliver in the early stages, but the signs for eye-gaze are promising.

"This technology captures the objective behavioral response," says Colin Johnson, CEO of Eyetools Inc., a San Francisco-based software developer. "Our clients have documented a ten-fold increase in click-throughs as a result of the proper application of the tools and methodology."

It is a fairly sure bet that privacy advocates will object to aspects of this new way of looking into consumer preferences, and may even slow its adoption.

"We realize that eye-tracking technology will be controversial, so we want to have public dialog about the issue in full view of all concerned," says Johnson. "We



IMAGES COURTESY EYETOOLS INC.

Eye-tracking analysis shows the drawbacks of a particular Web-page layout.

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In cities such as Tokyo or New York ... only a handful of the most **appealing images** get any attention.

believe that by encouraging public debate on the issue we can reassure all concerned that with ethical standards in place, the benefits of eye-gaze marketing research methods will be appreciated."

Tom Arai, Chairman of Catalina Marketing Japan K.K., whose U.S. parent company is a leader in behavior-based loyalty marketing, is more sanguine.

"People in the west have become overly sensitive to privacy issues. Provided it is used with discretion and the full consent of those participating, in Japan I think these types of technology will prove useful," he says. The promise, he adds, is that by grasping what really attracts consumers, rather than going by what they say, producers will make products better suited to people's true needs.

"This type of technology advance is inevitable," says Walter Ames, a vice president of management consultant A.T. Kearney K.K. "There are already technologies to digitize and track the movements of a shopper as the person moves about the retail-store environment. It would be hard to see how eye-tracking technologies can be stopped, even though there may be those who think it goes too far in looking into the mind of the consumer."

The tech spec

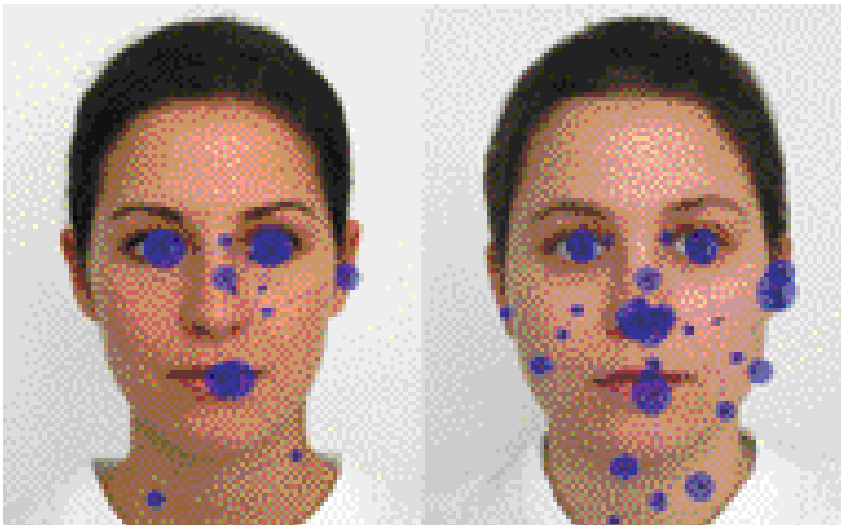
Eye-gaze systems cover a wide range in cost and complexity. Very inexpensive mini-cam-plus-goggle arrangements are fun to use and yield some insights about how someone entering a store, for example, might glance around the surroundings. This is not eyeball-movement measurement, however, or any attempt to decipher mental states. True eye-gaze systems are not cheap. One can set you back $50,000 or more, not counting training, analysis and fieldwork costs. Even so, many companies will recover their investment in just a few years.

There are several factors to consider: digital vs. analog, headgear vs. no headgear, software analysis tools, visualization interface and future upgrade path. Much of the equipment available at the moment is analog technology derived from medical research. Analog input makes data collection and analysis tedious and expensive. The newer all-digital systems still require some heavy desktop-computing power and hardware knowledge. On the plus side, they can present stimuli – things such as pictures of household item packages, advertising, Web pages and so forth – to the subject in a natural, unobtrusive fashion. They then record eye movements in detail, and output analytical data in a format that can be presented directly to executives making marketing decisions.

Truly mobile systems belong to the future. It will be a number of years before it becomes economically feasible to monitor a subject cruising the cosmetics section of a store, for example, capturing body- and eye-movement data for later analysis.

Learning what is really on the mind of the consumer is still a marketer's dream. New developments in eye-gaze technology, by allowing a peek through the consumer's own eyes, promise to make this dream come true.

Richard F. May works for the Japan Consumer Marketing Research Institute.



Eye-tracking shows how responses vary with slight changes to an image.

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