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Researchers say eye strain a concern as 3-D TVs debut

Vendor groups discuss but yet to act on sensitive issue

[Rick Merritt](#)

(02/25/2010 4:18 PM EST)

URL: <http://www.eetimes.com/showArticle.jhtml?articleID=223100762>

SAN JOSE, Calif. — Experts in human perception are expressing concerns stereo 3-D TVs now hitting the market could cause eye strain and related health problems. Industry groups are actively discussing the topic, but in their rush to get systems out the door vendors have yet to fund any major studies of the issues.

Stereo 3-D movies and television could generate as many as seven different perceptual problems, said [Martin Banks](#), a professor of optometry and vision science at the University of California at Berkeley. He gave a talk earlier this month for a broad group of consumer and Hollywood technologists about some of his biggest concerns, and was invited to come back to give a day-long course.

"They seem concerned about it, and my impression is they want to address this," Banks said of multiple contacts he has had with the industry. "They know they will kill the business if they make an unpleasant experience for people, [but] the question is what they will implement," he added.

"I think there are real things to be concerned about with the use of stereo displays becoming very widespread, especially if younger children are exposed to them routinely," added Simon Watt, a lecturer in the school of psychology at Bangor University in Wales who, like Banks, has been conducting studies on eye movements and stereo 3-D displays.

One of the main issues the researchers are studying is the so-called convergence-accommodation conflict. People watching stereo 3-D content have to adjust what they see at one point on a flat screen to information in the content that tells them that object is at another point in 3-D space. Such adjustments are not needed in the real world, so the human brain is not wired to handle them smoothly.

"We were the first to show that causes a variety of symptoms people can find unpleasant" such as headache and fatigue, said Banks.

Recent 3-D movies such as "Avatar" did a good job of minimize the effect, Banks said. But "as you decrease the distance [to the display] the problems created by this conflict accelerate and it's non-linear so they accelerate quickly.

"Things you could get away with in movies, you can't in a video game where a kid is close to the screen, so I am more troubled about stereo 3-D TVs than movies," he added.

Both Banks and Watt are working on one possible solution. In separate efforts they are developing so-called multi-focal-plane displays that could reduce eye strain.

So far 3-D TV consortia in the U.S., Japan and Korea have discussed the issue in their meetings, but not taken any concrete actions.

"It's still in the discussion phase--we need someone to take the bull by the horns and create teams and structure and so forth," said Chris Chinnock senior analyst at market watcher Insight Media and a member of the [3D@Home Consortium](#).

"First, we need to characterize all the factors that can cause eye strain, then find ways to measure the levels of the effects

and ultimately develop tools and rating systems for the content," said Chinnock, rolling out one scenario the groups have considered.

It's a sensitive issue for the vendor groups. "There's the danger of a panic about 3-D making you sick, and we've got to be careful about not starting that sort of stampede," Chinnock said. "The key to that is education and understanding what's real and what's not," he added.

Taking a small step forward, Panasonic recently contributed an undisclosed amount to the Entertainment Technology Center (ETC) at the University of Southern California to fund the first step toward a broad study. "Our goal is to get scientifically and statistically valid data on the impact of viewing stereoscopic 3-D content among the general population," said Phil Lelyveld, a program manager at the ETC.

The Panasonic money will fund two pilot studies to establish the design criteria for two large population studies that still lack funding. Essentially the group aims to provide eye tests to a few theaters full of consumers before and after watching 3-D movies.

"There is no real data today, it's all anecdotal," said Lelyveld.

In a marketing survey of 1,914 adults conducted in December by the ETC and the Consumer Electronics Association, 18 percent of the group expected they might have eye strain or headaches from seeing a stereo 3-D movie. Only 12 percent said they had the symptoms after watching one.

Many of the issues are in the content—not the TVs--and may not rear their head for another year or two, said Chinnock.

"I am fairly confident in the first year or two we will have pretty good content because people are on to this," Chinnock said. "I am more concerned about what happens a few years out when amateurs put out a lot of stereo 3-D content.

"If someone tries to put a movie created for a theater screen on to a 46-inch TV you could blow your eyeballs out trying to focus on objects that are supposed to be behind you," he quipped.

Some of the new TVs will use algorithms to automatically turn 2-D content into stereo 3-D. Banks said he has not studied the 2D-to-3D techniques.

Those techniques typically create a sensation of depth behind the screen, not in front of it, said Chinnock and others. Thus they may create visible artifacts users may find crude but not contribute as dramatically to the convergence-accommodation conflict as effects that create depth in front of the screen.

Meanwhile the latest crop of 3-D TVs are hitting retail shelves at prices lower than some expected.

Sears announced Monday (Feb. 22) it has new stereo 3-D capable TVs from Samsung at prices as low as \$2,500. Vizio, now [the largest vendor](#) of LCD-TVs in the U.S., announced models costing as little as \$2,000.

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