## Abstractions

**FIRST AUTHOR**

When it comes to buying light bulbs, consumer choice is pretty limited. Incandescent bulbs, the most popular option, are widely available and inexpensive, but most of the energy they produce is given off not as light but as heat. Green-minded consumers favour the much more efficient compact fluorescent lamps (CFLs), but CFLs typically cast a colder, less attractive light and, because they contain mercury, are difficult to dispose of. Several groups have thus been working on better alternatives. One option, under study by PhD student Sebastian Reineke and his colleagues at the Institute for Applied Photophysics in Dresden, Germany, is organic light-emitting diodes (OLEDs), thin films of organic molecules that emit light when current passes through them. Until now, their drawbacks have included their comparably low efficiency, but Reineke's team has hit on a solution (see page 234). He tells *Nature* more.

**What inspired this work?**

Trying to find solutions that save energy has been one of the driving forces of our research. OLEDs had already been shown to have the potential to become one of the next-generation light sources. We are now in global competition to accelerate the commercialization of white OLEDs.

**What is the benchmark for energy efficiency?**

CFLs provide 60–70 lumens per watt — the ratio of light produced to electricity used — compared with the 15 lumens per watt produced by the average 60-watt incandescent bulb. We have now achieved OLEDs that produce 90 lumens per watt and emit soft area light.

**Were there any surprises?**

OLEDs emit light as electrical current flows through their organic layers, with the colour of the light depending on the type and number of organic dyes used. But most OLEDs show a shift in colour when the strength of the current passing through them changes — an unwanted feature for dimmable light sources. We were surprised to discover no such colour shift in our OLEDs, no matter how much current we passed through them.

**What do you see as future uses for OLEDs?**

OLEDs are ultrathin devices that can be scaled to almost any size. You could use one as wallpaper — it would be a thin sheet emitting soft, comfortable light. Or it could be part of a window, where the organic layers — a few hundred nanometres thick, and invisible to the naked eye — are set between layers of glass. During the day it would just look like a window; at night you could turn it on and it would emit light. ■

# MAKING THE PAPER

Ami Klin

**Point-light animations reveal different focus of those with autism.**

Autism is a complex disorder characterized by a lack of social interaction and eye contact, and is typically diagnosed by three years of age. An earlier diagnosis — in the first few months of life — could improve outcome. With this in mind, Ami Klin, a clinical psychologist and director of the autism programme at the Yale School of Medicine, and his colleagues delved into the social development of very young children.

Young animals, from human babies to newly hatched chicks, preferentially focus their attention on the movement of living beings rather than inanimate objects — a trait that enables them to orient to a caregiver, necessary for survival. In 2000, Klin, accompanied by Yale neuroscientist and co-author Warren Jones, went to an animatronic studio in California to create animations that could be used to determine how young children respond to human movement, and how this response might differ in autistic children.

They used a technique that turns videos of human actors playing children's games, such as 'peek-a-boo', into animated dots of light able to convey human motion. Then, by tracking the eye movements of children watching the moving dots, Klin and Jones could measure the children's attention to human movement, and thus social interaction. "The eyes are the window to the soul, but also to socialization," says Klin.

A puzzling observation focused their efforts. A 15-month-old girl whose brother had autism was shown a screen divided in two: on one side the light displays were upright; on the other they were inverted, so no longer representative of human movement, and played backwards. The girl showed no preference for upright or inverted images — with one exception. During the 'pat-a-cake' video, one of the nine animations presented to her, she focused almost entirely on the upright video. "At first, we were confused," says Klin. However, further investigation established that this was the only animation in which the sound — in this case, clapping — was clearly synchronized to the light movement.

The duo suspected that autistic children might be more attentive to a physical stimulus (sound synchronized to motion) than to a social one (human movement). To test the idea, they showed the animations to groups of 2-year-old children with and without autism, and found that only those with autism had the same response as the 15-month-old girl (see page 257). "Then we sat back and thought we should be adventurous in order to learn the profound lesson this little girl was teaching us," says Klin.

They and their colleagues at Yale spent the next two years coming up with a method to quantify how much audiovisual synchrony there was in different animations — and compared that measurement with children's visual behaviour. In the end they were able to predict, with 90% accuracy, the children's visual preference on the basis of even incidental bits of audiovisual synchrony present in the animations.

Klin says the little girl helped them to understand that autistic children develop in a world where preferential attention is given to physical, rather than social, attributes. On the basis of this realization, Klin and Jones are now looking at ways to pinpoint when this divergence from typical social development begins. "We want to come up with a behaviour assay that will predictably diagnose vulnerabilities for autism in the first year, if not months, of life," Klin says. ■

# FROM THE BLOGOSPHERE

Women scientists in India get some inspiration to go with their aspirations. Writing on the Indigenus blog, Nature India editor Subhra Priyadarshini highlights a new book, *Lilavati's Daughters: The Women Scientists of India* (http://tinyurl.com/pqgknz). The book, named for the legendary daughter of a twelfth-century mathematician, presents 98 biographical essays and Priyadarshini recommends it for those in search of role models.

The book "has every emotion one ever attributes to women scientists — patience, angst, perseverance, fears, euphoria and above all incessant struggle in the face of a thousand odds," she writes. The book comes on the heels of announcements of government programmes aimed at easing the burdens of family-work balance on young women to help stem the high numbers dropping out of science. Whether such programmes will be implemented properly or embraced by women scientists is a topic that has been raised in several discussions at the Nature India forum.

The Indigenus post includes a link to the Indian Academy of Sciences, where the book can be read online (http://tinyurl.com/qtc5h7). ■

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