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INSIDE: CHAMPIONING A MISSION

A retrospective on the tenure of Alan D. Mathios
The Rebecca Q. and James C. Morgan Dean



College of Human Ecology

THE VISUAL BRAIN

New research could help grow awareness, legitimacy of debilitating syndrome

Search for Answers

Associate professors Adam Anderson and Eve De Rosa, from the Department of Human Development, are leveraging Human Ecology's fMRI capabilities to conduct innovative and potentially impactful research into Irlen Syndrome, a proposed perceptual processing disorder that impacts the brain's ability to interpret visual information.

"I've suffered debilitating effects since I was 14 years old," said Rebecca Chambers, referring to complex migraines that have put her in the emergency room and, at times, have caused her to completely lose her vision. "I saw every neurologist, I've been on every medication, I have done infusions I could do at home at the onset of a migraine and medications never helped."

Chambers is volunteering to have her brain scanned through Cornell's functional Magnetic Resonance Imaging (fMRI) lab for a study that focuses on a better understanding the condition, as well as methods of treatment.

The syndrome has been studied for a long time, but there is no consensus among researchers, scientists and doctors, many of whom are still unsure whether the syndrome exists or whether the symptoms usually attributed to it are best explained by other, better-understood problems. Currently, Irlen Syndrome is not embraced by any scientific or medical body.

"Because I've struggled with this pretty much my entire life, I hope it can get out there to the medical community that this is an actual thing," she said.

When suffering from Irlen Syndrome, an individual's brain has difficulty or an inability to process certain wavelengths of light, researchers say. In this way, light becomes a stressor on the brain, which in turn causes certain parts of the brain, such as the visual cortex, to become overactive.

It is this overactivity and inability to effectively process visual stimuli that creates a variety of visual, physical, cognitive, emotional and neurological symptoms, which can often be a lifetime barrier to learning and performance.

As a remedy, the Irlen Method was created 35 years ago by Helen L. Irlen '67, an internationally-recognized educator, researcher, therapist, scholar and expert in the area of visual-perceptual problems. Irlen also was an instructor and research assistant in psychology at Cornell, based in Human Ecology.

The method is non-invasive and uses colored overlays and filters in the form of glasses or contact lenses called Irlen Spectral Filters. These filters are said to improve the brain's ability to process visual information, reducing or eliminating perceptual processing difficulties.



After years of unsuccessful medical and psychological treatments, Chambers was lucky enough to see an ophthalmologist who met with her Irlen diagnostician. Both agreed that Chambers should be diagnosed with Irlen Syndrome. Chambers was prescribed the Irlen Spectral Filters and saw almost instantaneous results.

"There was almost an immediate change," she said. "I've been using the filters for more than two years now, and haven't had a single migraine since I got them."

For Chambers, it is a new lease on life. Not being able to concentrate previously, she can now read, something she hasn't been able to do for years. She is also now able to volunteer at her kids' school and coach her son's soccer team.

Irlen has been found to be hereditary, and Chambers was able to get help for three of her four children, now also diagnosed. Initially, her children's doctors thought ADHD, dyslexia or other behavioral issues were to blame for their symptoms, but Chambers said the Irlen method cleared up everything.

Studying the Irlen-Affected Brain

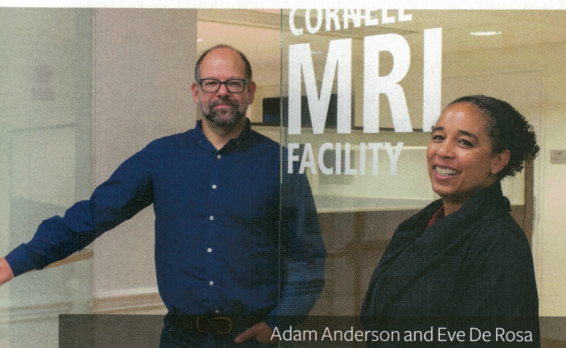
Anderson's and De Rosa's study is using the fMRI's capabilities to follow up on recent data examining how the primary visual cortex relays information to other regions of the brain. They also want to view the normalization of brain functioning through the Irlen method of treatment.

"A central component of Irlen Syndrome is visual stress, which is thought to originate in the brain rather than from the eyes," the researchers said. "This can manifest itself both as visual discomfort but also as difficulty with visual processing, including reading."

"Our study attempts to characterize how the visual brain is different in individuals with the syndrome while also assessing the role of prescribed color filters that successfully alleviate reported symptoms on visual brain activity patterns."

Anderson and De Rosa have been examining how the visual brain is influenced by sources of information beyond what comes in from the eyes. This includes subjective factors, such as emotions, and objective factors, like heartbeats.

"One of our takes on Irlen Syndrome is that it involves altered autonomic nervous system interactions with the visual brain. In addition to mapping out the visual brain of our participants, we simultaneously assessed patterns in the variability of heart rate, to examine heart-brain interactions," said the researchers.



Adam Anderson and Eve De Rosa



Sandra Tosta '98

Further, Anderson and De Rosa's research has been examining neural influences of color that go well beyond simple perception. They want to find out how it influences activity patterns throughout the brain to regulate how we feel, attend and learn.

"Because of this, it was natural for us to examine how colors may tune brain responses to help overcome visual stress," they said. "Indeed, in our work, we have found that people have unique brain responses to colors even outside of their color visual system."

"Some individuals are more tuned towards short wavelength, blue-green, and others to the long wavelength, red, end of the visible spectrum. This explains why one size, in this case color, may not fit all."

Anderson and De Rosa say that this work has theoretical implications for understanding human brain organization and the influence of development on the uniqueness of each brain. Beyond theory, this different view of how the brain works, which proposes a broader role for color than previously thought, should have implications for the translation of research into the real world.

"Whether it is optimizing work or a novel approach to treating disorders, the true test of these ideas is that they can change people's lives for the better," the researchers said.

Sandra Tosta '98, president of the Irlen Syndrome Foundation, and VP of Research Operations for the Irlen Institute, points to "one of the biggest issues is that people don't know Irlen exists, so raising awareness is a huge deal because it is estimated to affect a very large portion of the population, an estimated 12-14 percent where the

syndrome is extremely prevalent."

"This condition, as well as the solution, has been under scrutiny for 35 years even though there are three decades of research on the topic," Tosta added. "While there are 200 published studies [about Irlen], only very recently have they started to do research using brain imaging. What's nice about that, when it comes to this condition, is that it's an objective measurement of change."

"Up until brain imaging studies, researchers were relying on self-reporting from subjects, reading measures, and so forth, which are all notorious for skewed data because so many other elements come into play."

Tosta, Helen L. Irlen's daughter, is following in her mother's footsteps to bring light to this issue. "I always knew at some point I would probably go in this direction," she said. "I always had one foot in the door. I did my honors thesis at Cornell in Human Development on Irlen Syndrome." After Cornell, Tosta went on to receive a Ph.D. in educational psychology from UCLA.

A Collaborative Approach

The Irlen Syndrome Foundation piqued the interest of professors Anderson and De Rosa through the organization's work and research within the military community. A Cornell development officer connected Tosta with the researchers, and a collaboration was born.

To ensure unbiased data, the organization's role is limited to simply informing Cornell researchers about their current work, then leaving the researchers to move forward with their study. Few researchers are experts on the condition, and previous research has not identified much more than a hyperactive brain and visual cortex, Tosta said.

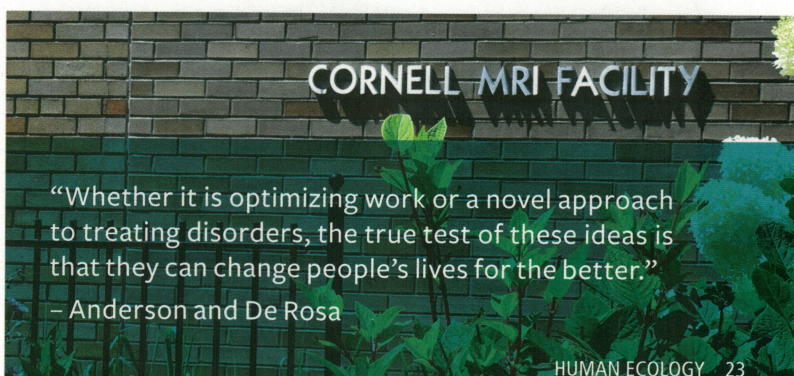
"That alone shows the stress and strain on the brain when trying to make sense of this visual information as it uses every trick

in the book it has to try and process this information," Tosta said. "When subjects put on their Irlen Spectral Filters, it normalizes brain function and takes away all of that hyperactivity and all of a sudden their brain looks like that of a typical person."

Tosta is hoping the research has a high impact on not only the medical community, but the lives of those who suffer with Irlen.

"When you get adults who finally after all these years have an explanation for their struggle and their pain, you would think they would be very happy," Tosta said. "Instead, we see a lot of anger: 'Why didn't anybody figure this out sooner?' For me, this really highlights the importance of awareness and making the public and the medical community more informed."

— Stephen D'Angelo



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