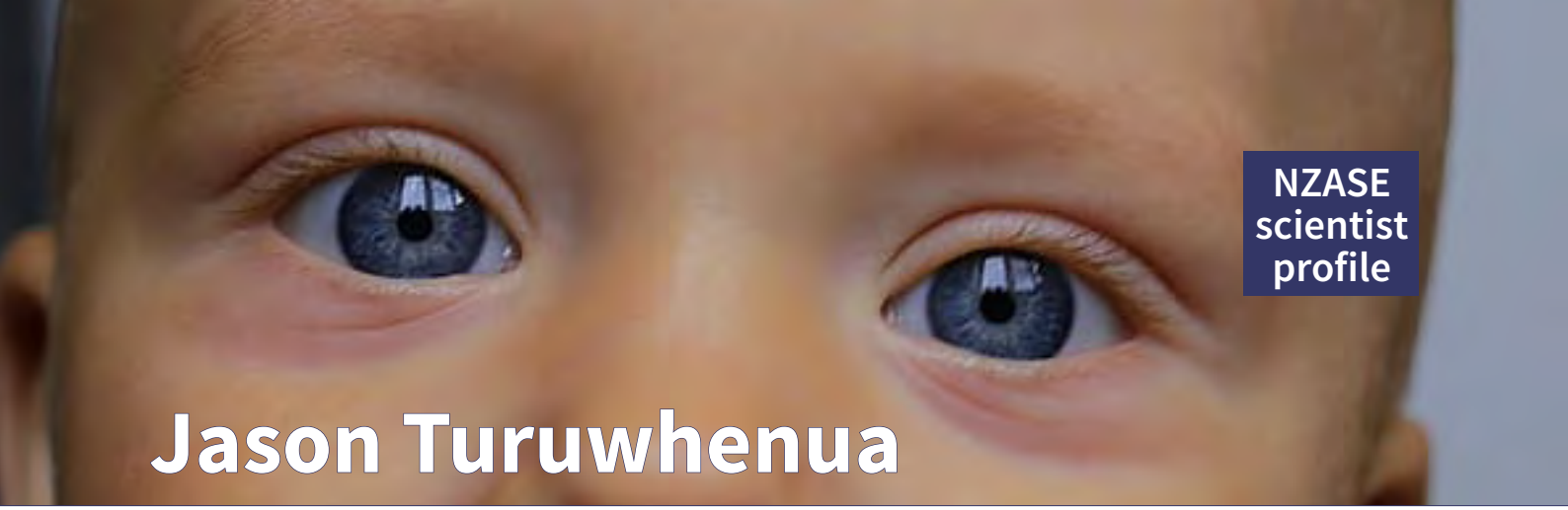


NZASE scientist profile

Jason Turuwhenua

Photo by Luidmila-Kot, Pixabay.

Born where and when

Rotorua, 1973; Ngāti Porou, Ngāi Tūhoe.

Schools

Karaka School and Wesley College, Auckland.
Subjects: Physics, Chemistry, Maths.

How he got into science

As a boy, Jason liked space, rockets, science fiction, computers and video games. "I like building things and figuring out how things work."

Training and jobs

Science degree in Physics
Masters degree in Science
PhD in medical physics, all at the University of Waikato.

Programmer, Southern Cross Healthcare. Supporting Māori and Pasifika students, University of Auckland Science Faculty.
Researcher, Auckland Bioengineering Institute, University of Auckland.

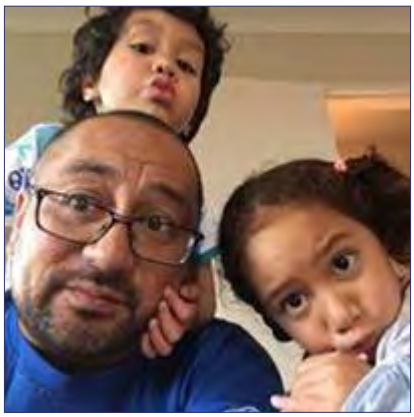
Field of science

Vision science – "I'm more of an engineer than a scientist; I like using engineering techniques with medical staff who deal with patients, to improve treatments."

Topics he studied

1 Measuring babies' lungs
"My Masters focused on developing software to measure stiffness in babies' lungs that caused breathing problems."

2 Testing young children's quality of vision
Jason's PhD studied how light transports through the eye. He has since led a 10-year project to develop and test a device to assess visual function in young children. The tablet software uses specially-designed moving patterns to stimulate and measure an automatic, repetitive, flicking eye movement that occurs only when people see a moving image. Whether or not people have that response is accepted as a sign of good or bad vision.

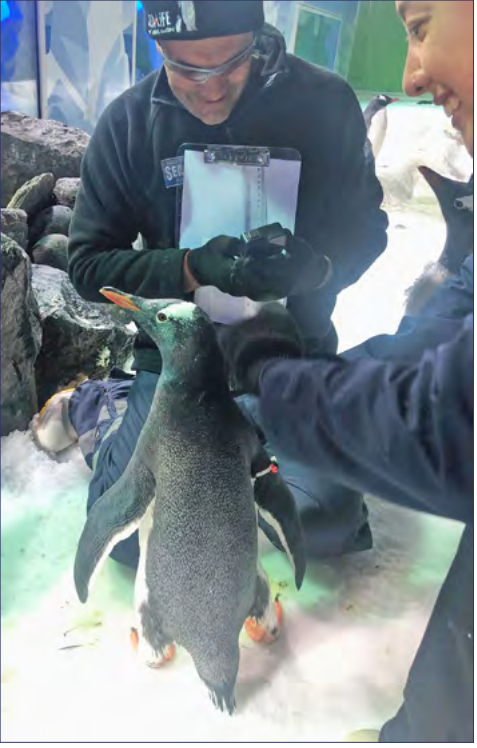


Jason with children Areka, top, and Maia.

Bioengineered model of the human eye
"We've created a physics-based computer model of the eye, and use it to investigate how light interacts with the eye. It helps predict where surgical improvements can be made or problems arise, without having to cut into real eyes. We hope that eye specialists can use it to show family members what the patient is seeing, and demonstrate how the problem might be improved by surgery or treatment."

The project combines three of Jason's interests: engineering, computer science and graphics, and is one of several long-term models of the organs of the human body at the Auckland Bioengineering Institute.

Studying penguin eyesight
"I'm helping opthalmologist and PhD student Peter Hadden explore what penguins at Kelly Tarlton's Sea Life aquarium in Auckland can see - I contribute the technology and make measurements. We projected patterns on



Jason, right, with Peter Hadden and a Gentoo penguin at Sealife Kelly Tarlton's Auckland. Photo: Samantha Simkin.

the walls of their enclosure to see if they'd be interested, and we had a flock of penguins running from all corners to watch our video. We shone a UV light on the snow, which humans can't see, but it seemed that the penguins were following the spot around on the ice - they don't usually look at the ground. Now the scientific team is designing experiments to test the clarity of penguin vision (visual acuity)."

How he finds things out

For the children's vision project, Jason's team developed tablet software that stimulates the eye movement and tracked with a camera, and compared results with standard tests used by eye specialists. To test the software they offered free vision tests to 220 students at Kia Aroha College, in south Auckland. Over 60 percent completed the eye checks, and free glasses were provided for students who needed them. That study showed that the software provided reliable results. The technology has also been trialled with other age groups here and overseas.

What he likes about science

"I like that we can make a difference in people's lives. I learn things interacting with medical staff; I started off working by myself, but collaboration is cool. I like knowing new stuff, understanding why things happen in certain ways, and putting together a whole picture."

Links

- A screen-based eye test for kids, *Noted*.
- Dr Jason Turuwhenua, *Cure Kids.*
- Detecting eye problems in two-year-olds, *Radio NZ*.

Most valuable result

The vision test for young children has stimulated international interest, because it has huge potential to improve children's sight. "As far as we're aware, it's unique," says Jason; "it would be great if it becomes a standard, regularly-used tool."

"Young children get bored, shuffle around a lot, and don't do what eye specialists ask, so specialists get only one shot", he says. And problems like amblyopia, or lazy eye – the most common cause of poor vision in our children – can become permanent if not found early and double the risk of blindness.

"The earlier we can detect this problem, the earlier we can start treatment and the better the results," Jason says.

When it's finalised, the test "will make a big difference to a lot of kids". His team has filed two patents for the technology, and a company set up by the university, Objective Acuity Ltd, is trialling the device and turning it into a sellable tablet.

"We want the device to be available in any health care situation with young children, such as Plunket rooms and pre-schools in New Zealand, as well as eye clinics".

Relating to mātauranga Māori

"We're working with Māori communities to see how the science we're doing can improve their vision, and to get the data we need for results. Now that we have the technology, we're using co-design to boost its use in Māori communities. We're incorporating Māori ways of doing things in our research process.

Ngā Kupu

From Te Aka Māori Dictionary and Paekupu

Kanohi - Sight
Kitenga - Seeing, vision
Mātai ahupūngao - Physics
Mātai pūhanga - Engineering
Pohe - Blind
Pūrere ōmata - Optical device
Whakamātau - To experiment.