

**Robert  
Aguilar  
Class of 2017**

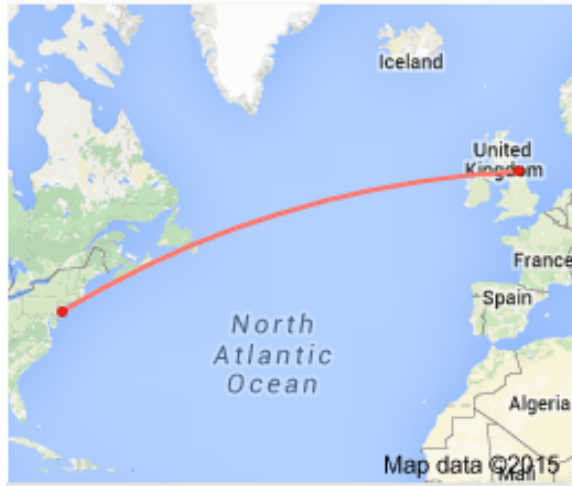


**Newcastle**  
University



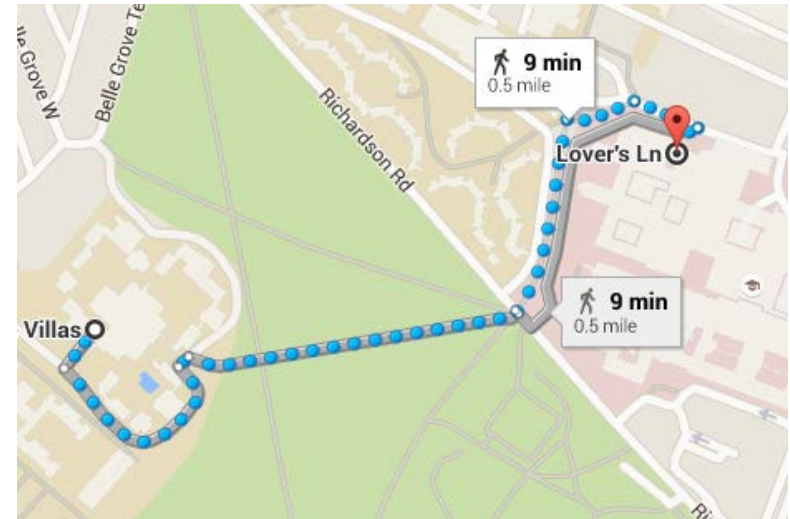
The Institute of Neuroscience

Princeton IIP  
Summer 2015



The first big step:  
← New Jersey to Newcastle  
3375 Miles and an 8 hour flight

Many other smaller steps (to and from work):  
Half a mile and a 9 minute walk



## Undergraduate students

### Current



**Nicola Goodship**

*Jun – Aug 2015*

Nikki is a first-year psychology student at Bath University. She is helping out with the [ASTEROID](#) project over the summer.



**Robert Aguilar**

*Jun – Aug 2015*

Rob is the second Princeton student to do a summer project in the lab, following Kevin Mizes last year. Rob is studying computer science and neuroscience. This summer, he is mining a large data-set of neurons collected in Bruce Cumming's lab at NIH.



**William Herbert**

*Jun – Aug 2014; Nov 2014 – Mar 2015; Jun – Aug 2015*

Will is back again working in the lab after completing his psychology degree here at Newcastle. Will first worked with us when he won a University Vacation Scholarship to support him during a summer project where he investigated praying mantis motion perception. He then did his third year psychology project in the lab, studying the development of stereo vision.

#### Publications with Herbert W

Nityananda V, Tarawneh G, Jones L, Busby N, **Herbert W**, Davies R, Read JCA (2015) [The contrast sensitivity function of the praying mantis \*Sphodromantis lineola\*](#) *Journal of Comparative Physiology A* 201(8) 741-50

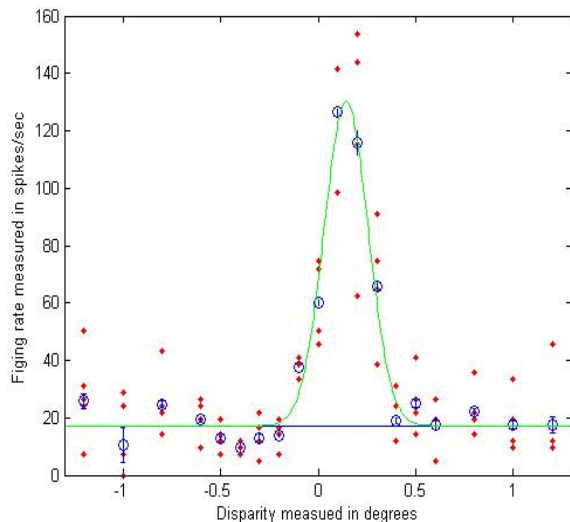
## Overview of work responsibilities:

- Mined a dataset of over 4000 neurons collected over the last 15 years.
- Exclude, classify, and then statistically analyze these neurons to test predictions on efficient encoding in stereoscopic vision. Specifically Li Zhaoping's (UCL) prediction that as receptive field size of the neuron decreases the preferred disparity phase decreases.
- Create a writeup that details how to access the data files efficiently and quickly, and make code available for anyone to analyze the data in the future.

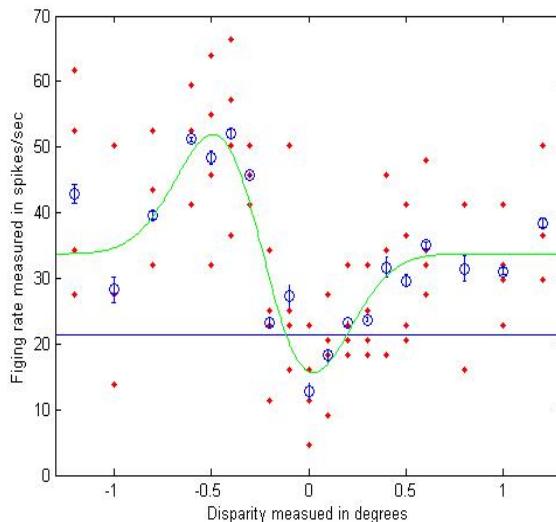
# A Taste of what was on my Computer Screen all Summer

$$G(\delta) = B + A \exp\left(-\frac{(\delta - \delta_0)^2}{2\sigma^2}\right) \cos[2\pi f(\delta - \delta_0) + \phi] \leftarrow \text{Equation used for the fits (Green)}$$

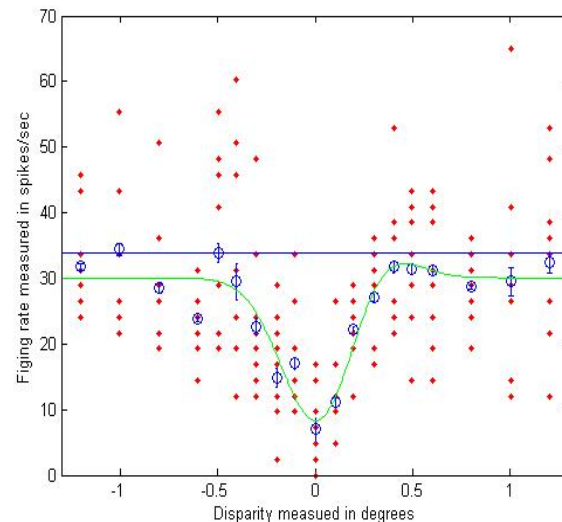
Example TE Cell  
Phase:  $0 \rightarrow \pi/7$



Example Near/Far Cell  
Phase:  $3\pi/7 \rightarrow 4\pi/7$



Example TI Cell  
Phase:  $6\pi/7 \rightarrow \pi$



# Immediate Impact of my Work:

Hopefully the data I have collected will be of use to both Jenny Read (my supervisor) and Bruce Cumming (Jenny's collaborator from the NIH) in either publishing a paper or validating the predictions of Li Zhaoping.

## Long Term Impact of my Work:

Ideally the writeup I have done will help other researchers interested in stereoscopic vision. The dataset is a huge and versatile resource, so being able to easily extract data from it is extremely beneficial. It could potentially help expedite research into anything that would benefit from examining these type of neurons.

# My Personal Journey in England



Fr. 20	1	2	3	4	5	6	7	8	9	10	Tot.
Eden	7	7	-	5	-	-	-	-	-	-	19
Steve	1	6	9	-	3	3	-	4	3	-	45
Erika	7	17	20	23	23	23	30	30	37	45	76
Sam	-	-	-	-	-	-	-	-	7	2	87
Rob	-	-	-	-	-	-	-	-	5	8	84

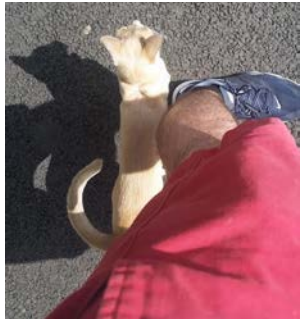
Eden 16.53

I realized I was terrible at bowling

But great at selfies!  
(Featuring Erika a fellow IIP-er)



And I even made friends (with cats and people)! Here we have Erika again, Sam (another IIP-er) and other summer students at ION





# Most Rewarding Aspect:

## Lab Dynamics



Participating in one of my lab's experiments  
while representing Princeton

# Most Rewarding Aspect:

## Lab Dynamics

Even though I was the only person in the lab working on my project I still interacted with everyone at weekly lab meetings. Engaged in exciting discussions on projects that were not my own and at various stages along in their conception, from just beginning to being written up as a paper.

Lab mates provided a helpful and intellectually stimulating environment to work in.

These meetings provided a glimpse into the world of academia at every level, including Masters, PHD and postdocs.



# Impact on my Career Direction

While I didn't fall in love with everything, there was a lot I did like.

Definitely has me thinking more seriously about graduate school.

Still not 100% confident about it though, I need to test the waters in industry or a startup before I know for sure

As far as subject goes, me project served to highlight the parts of neuroscience and computer science that I love, so it encouraged my choice of concentration and certificate.

# Huge Thank You To:

Jenny Read: My supervisor who was amazing the entire summer.

Ann Fitchet: In charge of running the ION summer program

Luisa Duarte-Silva: In charge of IIP.

