MAZE

ISSUE 7
A NOTE FROM
THE EDITOR:

I trust the 7th Issue of Maze finds you well, ready for the last leg of the 2015-2016 academic race. The days are longer, the number of deadlines shorter and not even the constant cacophony of seagulls can dampen the lively spring atmosphere.

This issue is completely diverse. From the basics of grammar in zebra finches to migraines, we truly hope you enjoy the literary spread that is Issue 7. The Maze team have also worked hard to bring some words of wisdom to our readers. As such, we hope you find the feature pieces on honours projects and useful societies to join beneficial.

All the best,
Natalia Fedorova

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THE OTHER FREUD
ELISKA KLIMENTOVA

BIRD IS THE WORD
GLEB DOBROVOLSKY

PSYCHOLOGY HONOURS PROJECT:
WHAT IS IT REALLY?
VARIOUS CONTRIBUTORS

MIGRAINES: MORE THAN “JUST A HEADACHE”?
KATHERINE ALLISON

NEW TO NEUROSCIENCE
DR MATTHEW BROADHEAD

MICROCEPHALY AND
THE ZIKA VIRUS: HOW MUCH DO WE
EMMA RITSON

PROFESSIONAL MEMBERSHIP

issue7.indd 2-3
02/04/2016 14:25:16
ANNA AND SIGMUND FREUD ARRIVING IN PARIS IN 1938 AFTER ESCAPING FROM NAZI-OCCUPIED AUSTRIA (BBC, 2013)

EILISKA KLIMENTOVA

There have been several figures throughout the history of psychology who have surpassed being famous merely within this subject field. Their work has become a part of the popular culture and their names are known even to those who, to put it mildly, have only a general knowledge of psychology. Pavlov, Jung, Chomsky and most of all, Freud. Sigmund Freud. Despite last year marking the 75th anniversary of his death, his work is still being re-interpreted in all types of popular culture, from the drama series Law & Order to the play Hysteria and even movies about the man himself. You can buy mugs, slippers, hoodies or candy with his bearded face on them - just google it (admittedly, the author of this article’s own laptop can be recognised by a “Pink Freud” sticker).

And yet there is someone named Freud who most people have never heard of. Their surname was Freud, but their first name was Anna.

Anna Freud was born in Vienna on the 3rd of December 1895 as the last of six children of Sigmund and Martha Freud, but it soon became clear that she was truly her father’s daughter - a shining example of his theories in practice. She is remembered as a smart, naughty kid, who kept away from her five siblings, and it soon became clear that her dependence on her father and his friends had provided her main source of education, soon became his co-worker. Together they attended the International Psychological Congress at The Hague and in 1922 Anna presented her paper, Beating Fantasies and Daydreams, to the Vienna Psychological Society. In this paper she was not only the author, but also very likely the main subject, something that was not particularly unusual back then. Even though her name is not included anywhere in the paper, six months after its original presentation it was not difficult to extrapolate whose psychosexual development was being discussed. Also, some passages of the text itself suggest a very personal relationship to the daydreamer, such as the very last sentence of the article: “We could say: she has found the road that leads from her fantasy life back to reality” (Freud, 1922).

The years that followed were an ongoing success for Anna. Between 1927 and 1934, she was secretary of the International Psychoanalytical Association and in 1935 she published what is probably her most famous book, ‘The Ego and the Mechanism of Defence’. Here she demonstrated her own abilities by diverging from her father’s drive doctrine, and focusing her research on ego instead. However, aside from all these achievements, these years were a time of great personal worry and distress for Anna. Her father had had his first outbreak of cancer several years previously (in 1923) and it soon became clear that his dependence on her was only going to increase. She became not only his nurse but his public representative, and remained so until his death in 1939. By then she and her father had witnessed the progressively worsening situation in Austria, resulting in the closure of Anna’s nursery and the need for the whole family to swiftly flee to London.

Here, a few weeks after the declaration of war, Sigmund Freud died.

Anna, however, quickly established her new life in England, finding it “indeed a civilised country.” She briskly set up a new nursery and became involved in a charity caring for orphaned children and single-parent families. After the war, Anna Freud and Kate Friedlaender set up Hampstead Child Therapy Courses as a direct result of Anna’s work with traumatised children during the war, in 1952 they added the Hampstead Child Therapy Clinic. The clinic provided highly acclaimed therapeutic sessions and courses for teachers and fulfilled Anna for the rest of her life - a solid success for someone who received honorary doctorates but never her own.

Emotionally deprived children remained at the centre of Anna’s focus. Alongside the clinic (which she served until her death) she continued publishing and lecturing, which provided opportunities for regular visits to the US where she delivered lectures and seminars at Yale on crime and family. She did much more than just keep her father’s legacy alive, she took it and used it as the basis for her own success. Success which, three years after her death in 1982, Reuben Fine described: “Anna gave up ordinary gratifications for the sake of her father and for her scientific work. She analyzed (sic), taught, lectured, trained, wrote, and was truly involved in everything that she did.” (Fine, 1985).

References:

In the study, researchers employed a Go-Nogo task paradigm (to receive a reward, animals not only have to react to correct stimuli, but also ignore wrong stimuli) to test whether zebra finches (small chatterbox birds which are, in fact, neither finches nor zebras) could learn the difference between prefixes and suffixes with rows of acoustic elements. Triplets of natural zebra finch song sounds were used as stimuli, supplemented with a fourth sound (codenamed ‘G’ for some sciency reasons) located either in front or after the three sounds which constituted the “stem”. The birds successfully learned to generalize the affixation rules and to discriminate between those sequences where the ‘G’ sound was added as a prefix and those where the ‘G’ sound was added as a suffix–irrespective of whether the “stems” were made of familiar or novel elements. By no means do these results suggest that zebra finch communicate with a proper language of their own, nor do they tell us anything about their capacity for abstract reasoning. Nevertheless, the ability to realise that a vocal signal has structure and to apprehend certain rules by which this structure can be manipulated may be an important milestone in the evolutionary path to a real language—some champagne corks may be flying in Leiden’ Institute of Biology labs as I’m writing this piece.

It is particularly exciting to see these developments in birds. Unlike dogs and primates, the two other groups most often studied in comparative psycholinguistics, avians don’t share as much history with us and may demonstrate a development of similar abilities provided by a different neurological apparatus. In the future, it would be most interesting if studies focused on whether animals can discriminate between semantics of different affixes—for that would show that they can link signals to certain meanings rather than simply react to them in a Pavlovian manner.

References:
PSYCHOLOGY HONOURS PROJECT: WHAT IS IT REALLY?

TOWARDS THE END OF THIS SEMESTER, A FRESH BATCH OF 3RD YEARS WILL HAVE TO EMBARK ON THAT DISTINCTLY WONDERFUL JOURNEY THAT IS THE HONOURS PROJECT. A COUPLE OF SEASONED 4TH YEARS FROM BOTH PSYCHOLOGY AND NEUROSCIENCE WERE WILLING TO SHARE SOME HARD WON WISDOM. HOPEFULLY WORDS FROM HONOURS PROJECT SURVIVORS (AT LEAST FOR NOW) WILL MAKE THE WHOLE MISSION LESS DAUNTING.

NATALIE, WHAT ARE YOU RESEARCHING FOR YOUR PROJECT?

I am researching within the field of intimate partner violence, but looking specifically at angry behaviours in couples.

HOW HAVE YOU COLLECTED YOUR DATA?

An online questionnaire is filled out at Time 1, after which participants may be asked to perform a task for two weeks (or not). After two weeks, they fill out the questionnaire again.

WHAT/WHO IS YOUR FOCUS?

I am looking at how self-control interventions could reduce unhelpful expressions of anger, and participants who have been in relationships for more than three months are welcome to participate. It doesn’t matter if they are long-distance, same-sex, polyamorous or anything! All are welcome.

- NATHALIE CLARK, SUPERVISOR: KATE CROSS

OK ROB, SO TELL US ABOUT YOUR PROJECT!

My objective is to investigate if we can predict how good someone is at detecting deception based on their personality and emotional intelligence.

HOW HAVE YOU COLLECTED YOUR DATA?

For the first phase of my study I had to interview participants, which threw up unexpected challenges, but was also a lot of fun. The second phase I just had to supervise people whilst they watched videos of people lying/telling the truth, and then answered personality/EI questionnaires.

WHAT/WHO IS YOUR FOCUS?

If I had to give three bits of advice it would be: always (always!) run a pilot, name your variables properly and then answered personality/EI questionnaires.

- ROB MORGAN, SUPERVISOR: KATE CROSS

HANNAH, WHAT IS THE FOCUS OF YOUR PROJECT?

My project is focusing on a specific test of anxiety in rodents, called the elevated plus maze (EPM).

HOW HAVE YOU MANAGED TO TEST THIS?

To test this I created modified versions of the EPM and the open field (OF) test. I had eight female and eight male rats who were run through two versions of the EPM as well as two versions of the OF.

AS BRIEF AS POSSIBLE, WHAT HAS YOUR PROJECT TIME LINE LOOKED LIKE?

So I started planning the project in 1st semester - it was ordered over Christmas. Induction began on the 6th January, and I handled the rats for about a month and a half (growing in most days to pick them up and one day to weigh them). I began testing towards the end of February and spent two consecutive days testing, then a week later two more consecutive days to finish - so a lot of preparation for a very short time of testing.

- HANNAH RISSE, SUPERVISOR: GILLIAN BROWN

IT DOESN’T FEEL LIKE A WORD ANYMORE – AN INVESTIGATION INTO SEMANTIC SATIATION

THIS SOUNDS REALLY INTERESTING, WHAT DOES IT MEAN?!

When you repeat or write a word too many times, you begin to feel as if you no longer recognise it - it becomes strange and unfamiliar. It is this phenomenon, known as semantic satiation, which has been the focus of my SH project.

HOW HAVE YOU MANAGED TO INVESTIGATE THIS?

Investigating this (with the assistance of my supervisor!) the creation of a computer program which would repeat images or spoken words and then allowed participants to sort them into categories and record response times - alongside an open question to gain insight into their subjective experience of this memory anomaly.

SOUNDS LIKE A LOT OF WORK! HOW DID YOU MANAGE THIS?

In order to create a balanced design, my winter break consisted of creating 60 folders, each containing 32 different files (in maths that means a near 2,000 objects generated and sorted!) Therefore, my advice to students in other years who plan to embark on a stimuli-heavy project? Never underestimate the power of caffeine!

- HENNA AUERBACH, SUPERVISOR: DR BILL PULVER

NOT ALL PROJECTS GET OFF TO A SMOOTH START, AS ISABELLE FOUND OUT...

Initially for my project I had an independent idea I was keen to focus on. At the end of third year I approached a couple of the supervisors who were offered projects and they were vaguely similar to my idea, and Jamie Ainge ended up agreeing to supervise my project. My initial idea involved working with penguins at the aquarium I was working at, however as enrichment training with the penguins began it became clear a much longer habituation period was required. This made it an unrealistic project for the time constraints of a SH project.

HOW DID YOU RESOLVE THIS?

I therefore switched my project to one in the rat lab focusing on grid cells. It was a behavioural project so after habituation it has involved training the rats to do a certain behaviour then altering the environment to assess how this impacts the behaviour. During training/testing I was in the lab for 4.5-5 hours each weekday across a period of five weeks.

- ISABELLE HUGGAN, SUPERVISOR: JAMIE AINGE

FOR MY PROJECT, I’M WORKING ON MAKING A MODEL OF A TRAP-JAW ANT.

The program, AnimaLab, has a fairly steep learning curve, and the tutorials are not always helpful, but when there’s nothing more rewarding than when something goes right. I have, however, managed to accidently create black holes, but there’s something to be said for saving your work every five minutes.

- AMY BYRNE, SUPERVISOR: DR STEFAN PULVER

AS YOU CAN SEE, THERE IS NO SET FORMULA FOR THE SH PROJECTS: SOMETHING THAT MAKES IT BOTH EXCITING AND PERHAPS A BIT DAUNTING. OUR BEST ADVICE AS 4TH YEARS? FIRST, START EARLY AND KEEP ON TOP OF YOUR WORK - IT IS DEFINITELY MANAGEABLE IN SMALL CHUNKS. SECONDLY, CHOOSE SOMETHING YOU ARE GENUINELY INTERESTED IN! YOU HAVE A WHOLE YEAR WITH IT, SO THINK CAREFULLY AND FINALLY, DON’T PANIC - YOU WILL GET THROUGH IT AND FINGERS CROSSED YOU’LL ALSO ENJOY DOING IT!

- KATE CROSS

NOW FOR A PERSPECTIVE ON THE NEUROSCIENCE HONOURS PROJECTS.

My project has focused on using drosophila larvae and optogenetic tools to investigate the neural control of transitions in locomotion. Advice for students to remember as they go into their projects would be: A) Write EVERYTHING in your lab book B) Don’t fret too much about who your supervisor is, I am yet to hear of a project that doesn’t sound interesting C) Nevertheless, Dr Pulver is a fab supervisor and you should snatch him up if you can D) Unfortunately, winter break is a great time to get experiments done.

- DR BILL PULVER

SUPERVISOR: DR BILL PULVER.
MIGRAINES—MORE THAN "JUST A HEADACHE"

KATHERINE ALLISON

THROBBING pain on one side of your head. Sensitivity to lights, sounds, smells. Nausea. Dizziness. It sounds like the beginning of a rough morning after a long night out, but it is actually the long list of symptoms of a migraine attack. To the truly blessed subset who have never experienced such an episode, count yourself lucky. To those who have had a migraine, you will understand that it is so much more than "just a headache." And finally, a special shout-out to my fellow chronic migraine sufferers where these episodes have become more of a lifestyle than a one-time ordeal.

Migraines are a strange and little-understood neurological condition (and it is considered a disorder) that affects women three times more often than men. The physiological mechanisms are not well understood, though dilating blood vessels in the brain have been implicated. Attacks typically occur in 3 stages. 1) Pro-dromal stage—people can become tired, irritable, and unable to concentrate. A small subset of migraine sufferers have auras before the onset of a migraine. These include dizziness, visual phenomena resembling strange flashy lines (so you feel like your hallucinating), and tingling sensations that travel across your face (so you think you’re having a stroke). I’ve experienced all three. 2) Headache stage—this can last from one hour to four days. I’ve experienced both—plus everything in between. 3) Post-dromal stage—this is characterized by fatigue, nausea, an inability to concentrate, and ironically enough, a dull headache. Think of it as a migraine hangover.

Treatment is a balance between avoiding triggers, acute medication to treat migraines at their onset, and daily preventive medication for those of us who have them frequently. The list of potential triggers is dizzying and exhausting to juggle. It includes dehydration, hormone changes, lack of food, stress/sleep/caffeine (both too much and too little—this is great to dance around as a student), and foods that contain tyramine and additives (so all the fun things like alcohol, cheese, and chocolate). Acute medications include NSAIDs and serotonin agonists called triptans. Triptans constrict blood vessels in the head and block pain signals from sensory nerves innervating part of the face. There are seven different triptans that come in a variety of forms (Rizatriptan is my personal favorite). Finally, preventive medication is recommended for people who get four or more migraines a month. They involve a complicated mix of medications that can take up to three months to work. The three main categories are: beta-blockers, which prevent dilation of blood vessels in the brain; anti-depressants, like SSRIs that block re-uptake of serotonin; and anti-convulsants, for which the mechanism of action is unknown. Unfortunately many of these medications come with nasty side effects and finding the right balance is a difficult task.

Migraines are debilitating and learning to cope with them in daily life is stressful, frustrating, and probably a trigger within itself. However, current research is diligently looking for migraine causes and better treatments. A new class of drug targeting CGRP, which controls the opening of blood vessels, is looking promising in Phase II clinical trials. Finally, lifestyle changes can help keep migraines in check. A regular routine, good diet, exercise, and support system are helpful in managing attacks. Some have even found that cognitive behavioral therapy and acupuncture help keep their migraines at bay. Migraines are a complicated, multi-faceted condition, and as I wait for the development of new treatments, I’ll be in my dimly lit room avoiding chocolate and loud noises.
NEW TO NEUROSCIENCE:
DR MATTHEW BROADHEAD

I started my post doc position here just before Christmas, only a week after having passed my PhD viva at the University of Edinburgh (the last six months have been a blur!). During my PhD I used a host of advanced super-resolution microscopy methods to study the nano-architecture of proteins at synapses in the brain. The work I’ll be doing here at St Andrews, however, is completely different!

Working with Gareth Miles and Stefan Pulver, I plan to develop ways in which to study glial cells in the spinal cord, and ask whether they have a functional role to play in spinal cord circuitry and locomotion. It’s a bit of a leap from my PhD but this is actually a topic I’ve been interested in for a long time.

As an undergraduate I did a placement year at the University of Nevada, Reno, US. I did not choose to go there, I should add, but I’m happy the placement office pushed me into going there, as it was a truly unforgettable experience! There I used calcium imaging techniques to study the glial cells in the enteric nervous system and demonstrated that they showed increased activity in response to contraction events in the colon.

Since then, I’ve always been interested in neuron-glia communication and its importance in all aspects of nervous system physiology and behaviour. Glial cells make up 90% of the cells in our nervous system, and yet for the last hundred years neuroscience has focused predominantly on the neuronal portion of 10%. So I’m very excited to be here for the next few years working on this project. The tricky part will be developing the methods with which to study glial communication in the spinal cord and locomotor control. But the refreshing aspect is that we have a relatively simple set of biological questions and goals to work towards.
Microcephaly and the Zika Virus: How much do we know?

EMMA RITSON

Gleyse Kelly da Silva holding her daughter, Maria Giovanna, who was born with microcephaly in Recife, Brazil. The birth defect has been linked to the Zika virus. Credit: Felipe Dana/Associated Press. Source: New York Times: http://www.nytimes.com/interactive/2016/health/what-is-zika-virus.html?_r=0

Microcephaly is associated with underdevelopment of the head and the brain, resulting in a range of problems from intellectual disability to seizures. There are multiple degrees of severity of the condition but it often proves fatal. Microcephaly affects the vulnerable developing foetus and can be caused by exposure to certain substances or infections during pregnancy. The condition is thought to particularly target development of the cerebral cortex—a relatively large and highly folded structure that is important for memory and other cognitive functions—perception, language and consciousness. At present, microcephaly can be diagnosed during the second or third trimester of pregnancy with an ultrasound test, or after birth using a physical examination and then a CT or MRI scan.

The Zika virus is carried by Aedes aegypti mosquitoes and has plagued South and Central America, along with Mexico. Until recently, Zika was not considered to be serious, with many infections being asymptomatic and others causing only a moderate fever with flu-like symptoms. However, in May 2015 a disturbing trend became apparent—a surge in the incidences of Zika sufferers coincided with a vast increase in the amount of infants being born with microcephaly in Brazil. Subsequently, in February 2016, the World Health Organisation listed the Zika virus as an international public health emergency.

The association between Zika and microcephaly is highly worrying because it suggests that Zika can cross the semi-permeable placental barrier and alter neuronal development. Evidence beyond association has also been identified, with Zika being present in the amniotic fluid of two pregnant women carrying foetuses with microcephaly. Now that the link between Zika and microcephaly is becoming more apparent, the need to understand why this is occurring is desperately important.

A vital study by Tang et al. utilised human induced pluripotent stem cells to explore the mechanisms of Zika’s action and shed light on whether it directly infects human neuronal cells. The researchers derived forebrain-specific human neural progenitor cells - these cells form the brain’s cortex along with dividing to form new neuronal cells. Through use of immunostaining, they identified that neural progenitor cells were readily infected by the virus far more than other cell types, such as embryonic kidney cells. This suggests the developing cortex is highly vulnerable during Zika infection and provides evidence for why foetal microcephaly might arise after an infection during pregnancy.

Furthermore, the study found that along with infected cortical neural progenitor cells being hijacked to produce more copies of the virus, gene dysregulation was present—affecting the genes needed to combat viral infection. After infection, cells often died, or were unable to divide, meaning that development of the cell population was greatly impaired.

These findings by Tang et al. begin to unravel what is known about Zika and how it might be related to microcephaly. The study identifies the developing brain’s most vulnerable areas and provides an in vivo model where the progression of Zika infection can be rigorously tested. Importantly, the vulnerable cell types identified in the study can also be utilised in the development of treatments for microcephaly.

Despite the importance of the Tang et al. study, there are still a lot of unknowns surrounding the Zika virus and microcephaly. A clear causal link needs to be developed along with a detailed understanding of how it occurs - from how the virus crosses the placenta, to why it targets neural cells. Neuroscientific research like that of Tang et al. will prove vital in the development of therapeutic tools to combat Zika and prevent the unnecessary death and suffering the microcephaly causes.

PROFESSIONAL MEMBERSHIP

JOINING SOCIETIES IS AN INTEGRAL PART OF THE STUDENT EXPERIENCE, THUS IT IS UNSURPRISING THAT THE BENEFITS OF DOING SO EXTEND BEYOND THE UNIVERSITY ECOSYSTEM. JOINING NATIONAL OR EVEN WORLDWIDE SOCIETIES CREATES A WINDOW INTO SPECIFIC FIELDS, ALLOWING YOU TO MAKE BETTER-INFORMED DECISIONS ABOUT YOUR FUTURE CAREER.

TO MAKE THE WHICH-SOCIETY-SHOULD-I-JOIN DECISION PROCESS EASIER, MAZE HAS PUT TOGETHER A TABLE OF A NUMBER OF SOCIETIES IN THE DIFFERENT FIELDS OF PSYCHOLOGY THAT ARE WORTH A LOOK. ENJOY.

OF COURSE, YOU CAN ALWAYS JOIN A SOCIETY ONCE YOU REALIZE YOU WANT TO GO TO A CONFERENCE IT IS ORGANIZING OR APPLY FOR ONE OF THEIR GRANTS. REALISTICALLY THOUGH, THE CHANCES OF YOU READING THE JOURNALS ARE MUCH HIGHER ONCE YOU’VE PAID FOR ACCESS TO THE, SO, IN THE WORDS OF PROFESSOR TRELAWNEY: (JOIN SOME SOCIETIES AND) BROADEN YOUR MINDS!