



Ψ **psychOUT**

ISSUE 14

FEATURE THEME

Animal Cognition

ΨSYCHOUT

CONTENTS

FEATURES

06 *WHAT CAN WE LEARN FROM AN OCTOPUS?*

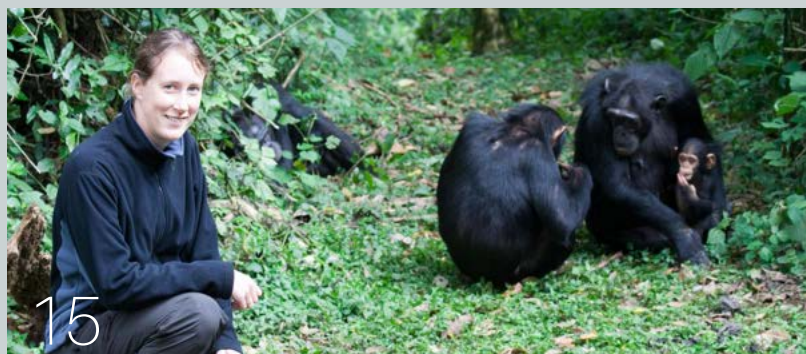
09 *HUMAN AND ANIMAL COMMUNICATION*

PSYCHOLOGY IN ACTION

12 *UNLOCKED GRADUATES*

INTERVIEW EXCLUSIVE

15 *PROFESSOR KATIE SLOCOMBE*



15

INTERVIEW EXCLUSIVE

Lucy Stafford interviews Professor Katie Slocombe to hear about her latest research.



09

FEATURE

Kitty Butterworth compares the communication of animals and humans.



12

PSYCHOLOGY IN ACTION

Nicole Collingwood explains what psychology students can gain from joining an Unlocked Graduates programme.



06

FEATURE

Marysia Witczak discusses the hit Netflix documentary "My Octopus Teacher".



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ΨSYCHOUT

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EDITOR'S NOTE

This issue explores animal cognition, with articles focusing on what we can learn from an octopus, the advancement of animal communication, and the research of Professor Katie Slocombe. This issue also includes an article about the opportunities offered by Unlocked Graduates.



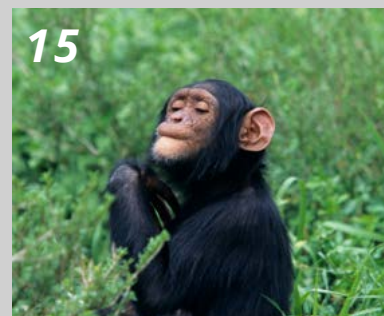
As you've probably guessed from the cover, this issue of PsychOut is all about animal cognition.

The scope of this issue is wide; from what we can learn from octopuses, to postgraduate plans with Unlocked Graduates! PsychOut also features the advancements in animal communication and an interview with one of York's very own lecturers who details her experience as a researcher in comparative psychology. We would like to thank all the writers for their outstanding contribution to this newest issue of PsychOut and can't wait to publish more of their work. We would also like to give special thanks to Katie Slocombe for agreeing to be interviewed for this issue.

We hope all our readers are well and staying positive!

LUCY STAFFORD & HATTIE JONES

Editors



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<https://www.york.ac.uk/psychology/news-and-events/psychoutstudentmagazine/>

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Features

- LEARNING FROM AN OCTOPUS
- ANIMAL AND HUMAN COMMUNICATION

ISSUE 14



LEARNING FROM AN OCTOPUS

A discussion of the Netflix documentary "My Octopus Teacher".



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HUMAN AND ANIMAL COMMUNICATION

A comparison of communication.

What can we learn from an Octopus?

BY MARYSIA WITCZAK



In the Netflix documentary “My Octopus teacher” Craig Foster describes his incredible friendship with an octopus living in the ocean waters just north of Australia. Day by day, he gained her trust and was introduced to the incredible underwater world. He observed that during hunting the octopus was strategic and her actions seemed to be well thought out. On the other hand, when the water was calm, she would play with fish or show him around the area.

Craig was mesmerized and shocked that an animal so seemingly simple could show emotions and personality. The unique experience turned out to be therapeutic for the diver. In the same way that Craig Foster was taught a lesson about himself, maybe these almost alien like animals can teach us something about us as a species and our evolution.

Let's start by taking a look at the octopuses' nervous system. How much truth is there to the statement that octopuses have 9 brains? Although the sentence is not entirely false, the idea of nine brains is a generous exaggeration. Octopuses have one of the most complex nervous systems within the mollusc phylum, composed of the central brain and eight ganglia structures that process information and provide feedback to each arm (Fabris, 2018).

It is said that the compartmentalization of the brain evolved to avoid the overload of the central circuits (Schnell et al., 2020). Hence, there was some room left for the development of complex cognitive functions. Due to an early evolutionary split between vertebrates and invertebrates, human cognition is said to have developed independently. Interestingly just like us and other mammals, cephalopods exhibit signs of highly developed perception, learning, and memory abilities (Schnell et al., 2020). The question is, how can these seemingly simple animals perform complex cognition tasks?

Even on YouTube, one can find multiple videos of octopuses opening jars and escaping tanks. However, the extent to which this behaviour can be classified as complex is debatable. It might be impressive, but jars and tanks closely resemble rock structures from the bottom of the ocean (Fabris, 2018).

More interestingly, in the book "Other Minds", the author describes incidents where octopuses seemed to like some keepers more than others. Similarly, research has found that octopuses were able to discriminate between two individuals wearing the same uniforms.

Additionally, octopuses as a nocturnal animal are known to dislike strong, bright light. Multiple labs have reported the animals learning how to turn the lights off using water baubles (Fabris, 2018). Such behaviours are especially exciting because they are signs of incredible adaptation skills and perception in octopuses.

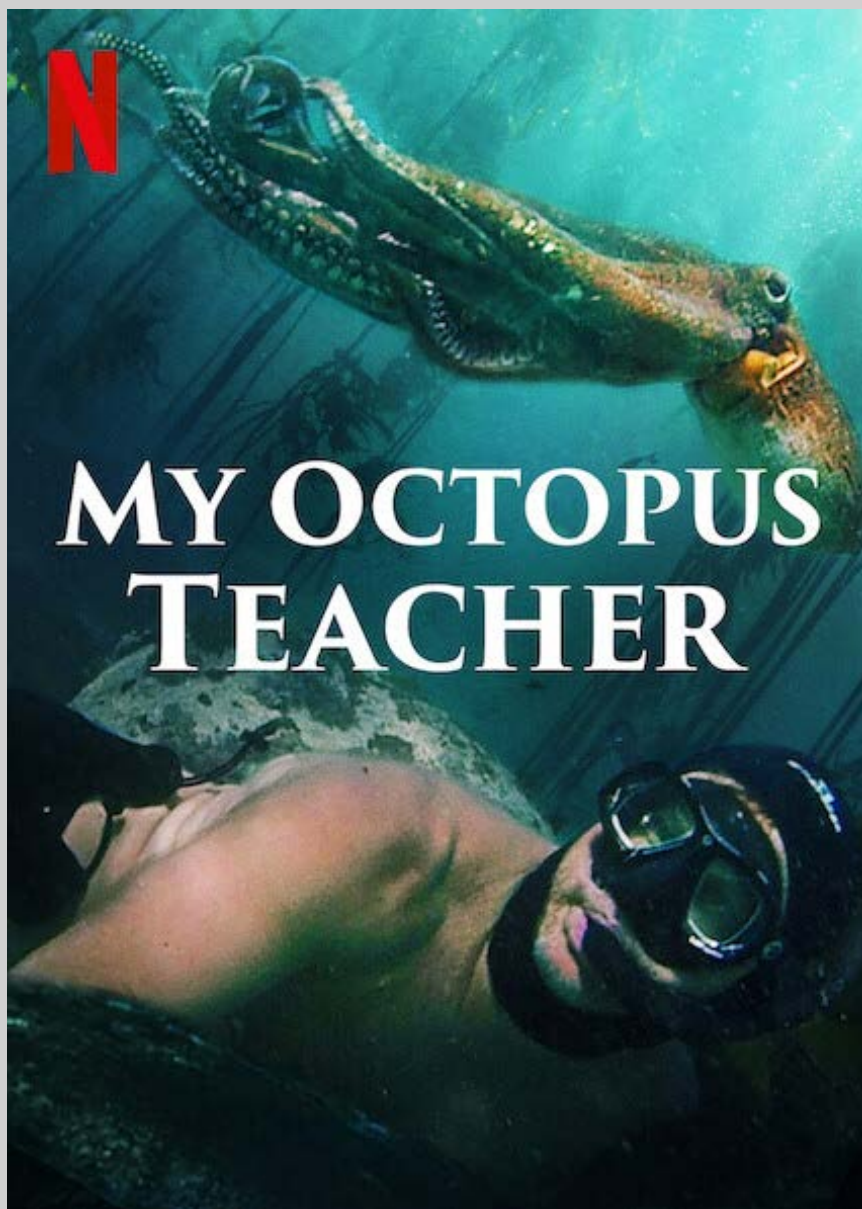
Scientists have hypothesised that the loss of a hard, protective shell is the reason for the development of more advanced cognitive skills in octopuses (Schnell et al., 2020). The lack of a natural shield causes animals to be more vulnerable to predatory attacks. Thus, along with

foraging challenges, the lack of a natural shield may be the main drive for octopuses to invest in the brain.

One of the examples can be found in a 2009 paper which showed octopuses creating portable homes out of empty coconut shells found at the bottom of the ocean. In case of a sudden shark attack, octopus would hide between two nutshells to avoid being eaten (Finn et al., 2009).

The shells would even be carried around when predators were not present. This suggests that octopuses can plan for the future, and even have object permanence abilities.





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Let's go back to Daniel's description of the octopuses' playful side. Theories about play behaviour usually describe play as a way of learning amongst social animals (Pearce, 2008). Thus, it is less commonly observed in invertebrates, especially because of the lack of social relationships.

However, once again, our distant alien-like relatives surprise us. Studies have shown that octopuses can discriminate between food and non-food objects as they display different

behaviours towards food and Lego blocks.

Moreover, the effect of age on the play behaviour was not observed, showing that octopuses, regardless of age, interact with objects (Kuba et al., 2006).

Findings of another study also suggest that octopuses vary in their aggression, avoidance, arousal, and engagement (Sinn et al., 2001). Once again, octopuses strike us with their remarkable curiosity, and force us to question if we might have more in common than we think.

What can these incredible animals teach us about ourselves? Even though it remains unknown whether the behaviour is driven by complex cognition or simpler neurological mechanisms, the studies on octopuses can help us understand the evolution of cognition as well as intelligence.

The current understanding of conscious experience may also be challenged. It is exciting to look at how the fields of evolutionary and comparative psychology can expand thanks to these mysterious animals.

ADVANCEMENT AND SURVIVAL: THE COMMUNICATION OF ANIMALS AND HUMANS

BY KITTY BUTTERWORTH

The scientific comparison between humans and primates feels to most an age-old one. Ever since the publication of Darwin's theory of evolution, scientists have studied the biological and ethological similarities between animals and humans. However, two key areas of comparison remain unexplored: the similarities and differences between the forms of communication learnt by animals and babies in the early stages of development, and the possibility for primates to learn more advanced forms of communication such as language.

To discover the potential for advancement in animal development, it is essential to understand the process by which animals learn communicative and cognitive skills compared to humans. Extensive research into human cognitive development has unearthed several complex theories, such as Piaget's five universal stages of development, in which children learn skills such as object permanence and conservation, and Vygotsky's explanation of the importance of sociocultural context. The theory that can be applied to animal development is the social learning theory. The three stages of the theory—observation, vicarious reinforcement, and imitation, the process by which some theorise children develop skills such as non-verbal communication—can be mirrored against the way primates acquire communication skills necessary for survival. Chimps are a prime example of this concept. Studying their behaviour, both in their natural habitat and a laboratory environment, has revealed the



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Extensive research into human cognitive development has unearthed several complex theories, such as Piaget's five universal stages of development, in which children learn skills such as object permanence and conservation, and Vygotsky's explanation of the importance of sociocultural context

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significance of observation in their learning of communication and cognitive skills. Chimps create a large number of unique, non-verbal gestures to communicate and they have been shown to adapt these gestures for their benefit. For example, a study conducted at the Primate Research Institute found that chimps were able to abandon an inefficient method of drinking from a carton in favour of a more efficient one after observing members of their group using it. Hence, the process by which they learn can be directly compared to social learning; chimps observed an unfamiliar method, and the reward that was obtained (a higher amount of juice) encouraged them to imitate that behaviour in order to get the same reward. Directly discovering the cognitive process behind this change is impossible due to communication barriers, but if this process is the one by which humans cognitively develop, it hints at a greater similarity between humans and primates than previously assumed.

This preliminary finding suggests that there are inherent similarities between how humans and animals learn, and evidence to some that animals could develop to a humanlike level of communication. Attempts to teach primates sign language have proven largely successful. One of the most famous examples remains Kanzi, a bonobo chimp who was able to communicate with humans using a lexigram and American Sign Language, apparently understanding the meaning of up to 3,000 words. Kanzi's knowledge extended to not only the comprehension of singular words, but also sentences and word order. Thus, she could communicate better than human

infants. Other primates, such as Washoe, who learned 350 signs of ASL, and even non-primate animals, such as dolphins, have generated the same results. This suggests that it is possible for animals to learn forms of human communication.

However, their ability is limited. Attempts to teach Kanzi, Washoe and other primates spoken language, the utmost form of human communication, have all been unsuccessful. Even immersive experiments, in which a chimp was raised in a human family and had extensive speech therapy, have yielded no significant results. This inability is attributed to anatomical incompatibilities; while humans can control the movement of the larynx in order to produce speech, animals lack this ability. This means that without physical interference, it is unlikely animals producing fluent speech will ever be a possibility.

To most, this may be clear evidence that animals have inferior cognitive abilities compared to humans. However, a better conclusion is that both species have evolved to favour skills that benefit their chances of survival, and are most frequently needed. For humans, spoken language is vital- it allows us to form relationships, access resources, and function in society- but for animals it is not. While human babies have the instinctive urge to cooperate with others, animals do not. Humans also have innate cognitive capacity of joint attention and understanding of others communicative intentions, while animals also do not. Instead, their survival depends on cognitive skills that allow them to adapt to dangerous habitats. Depth perception is one of these skills and thus it is evidence in young animals. This was

demonstrated in Gibson and Walk's (1960) study as chicks, goats and lambs, as little as one day old, refused to step onto the "deep side" of the visual cliff, and adopted a defence position when placed directly on it. This demonstrates that animals can develop critical cognitive skills, sometimes earlier than humans, as human infants do not develop this ability until they are mobile. Animals can also make effective tools to access food earlier in development than humans.



Kanzi, a bonobo chimp who was able to communicate with humans using a lexigram and American Sign Language, apparently understanding the meaning of up to 3,000 words



It would be unjust to say animals are cognitively inferior to humans, or under-developed. Whilst they may not have access to the same levels of communication, their cognitive abilities are in many ways equal to and even exceed us. The skills that we see in animals have evolved to improve their chances of survival. Thus, animal communication is as equally valid and essential as human communication.

Psychology in Action

UNLOCKED GRADUATES

ISSUE 14

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**AWARD-WINNING
TWO-YEAR
LEADERSHIP
DEVELOPMENT
PROGRAMME**



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**COMPLETE A FULLY-
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MASTER'S DEGREE.**

UNLOCKED GRADUATES

Written by
Unlocked student
ambassador, **Nicole
Collingwood**

Forty-eight percent of prison inmates go on to reoffend within a year of their release (Newton, May, Eames, & Ahmad, 2019). This reoffending is estimated to cost UK taxpayers £18.1 billion a year (Newton et al., 2019). But offending impacts more than just the economy; there is also a human cost. Thirty-eight percent of the average monthly prison population reported having difficulties with their mental health or wellbeing when surveyed (National Audit Office, 2017) and in 2016, suicide rates in English and Welsh prisons were the highest they'd been since 1999 (Fazel, Ramesh, & Hawton, 2017)

Unlocked Graduates aim to make a difference to the prison system. By offering graduates the chance to earn a fully funded Masters degree whilst working in a prison, Unlocked brings fresh thinking and new ideas into the prison service. Since they have more contact with prisoners than any other professionals, prison officers have a unique insight into what can be done to help support



inmates. Unlocked helps participants make their ideas a reality by offering their prison officers the opportunity to write a policy paper, and run projects in the prison they work in via funding from the Innovation Acceleration Programme.

Emily is an Unlocked Graduate at HMYOI Aylesbury who used funding from Unlocked and Covid-19 support to run a Mental Health Awareness Week project (Unlocked Graduates, 2020b).

She described her experience in a blog post and explained the project she ran based around this year's World Mental Health Week theme: kindness. The project included a 'Random Acts of Kindness' campaign which involved treats being left all around the prison for staff members and inmates to find. Each treat came with a note encouraging whoever found it to pay the act of kindness forward. Emily also gave the inmates wellbeing packs which included



Thanks to Zeba's hard work, inmates and staff alike were able to celebrate Eid despite the challenging circumstances.



an Action for Happiness Coping Calendar. The calendar included 30 days worth of acts of kindness, advice from previous inmates on how to look after their mental health, and a lollipop with a positive quote attached. Staff were encouraged to sit with each other to check in about how they were feeling and each department was given tea, coffee, and biscuits. Emily also sent out daily emails informing staff members about mental health and the support available to them. With inmate visits being cancelled and staff members working longer hours due to Covid-19, it was especially important to mark World Mental Health Week this year. Emily was able to give people at HMYOI Aylesbury a much needed morale boost during a difficult time.

Visitation restrictions due to Covid-19 meant that prisoners were unable to see friends or family members for Eid and religious services were postponed. Unlocked participant Zeba wanted to ensure the prisoners at HMYOI Aylesbury were still able to celebrate Eid so she took charge of organising Eid festivities (Unlocked Graduates, 2020a). With the help of Unlocked, the Aylesbury Chaplaincy department and Zeba arranged with the Senior Management Team to make Eid special. All of the residential

units were decorated for Eid for the first time, including the segregation department. When residents requested something other than the usual prison food for the occasion, Zeba helped arrange a hot breakfast on Eid morning and a special menu of Middle Eastern cuisine for lunch. Each resident received a package of baklava (a Middle Eastern sweet pastry treat) with an Eid message, and Muslim residents were also given Eid goody bags containing dates, an Islamic prayer book, prayer beads, a religious hat, and a miswak. The items were donated by a local charity. Staff were also given the opportunity to celebrate later in the week at a socially distanced Eid meal where they were served the same menu the residents had previously enjoyed. Thanks to Zeba's hard work prisoners and staff alike were able to celebrate Eid despite the challenging circumstances.

If you have an interest in forensic psychology, are eager for a new challenge, or want to make a difference after graduating, Unlocked could be for you. Applications for the 2021 cohort are now closed, but the 2022 cohort applications will reopen from September to December of 2021. If you'd like to learn more, follow [this](#) link.

Interview Exclusive

WITH PROFESSOR KATIE SLOCOMBE

ISSUE 14



ACADEMIC AND CAREER BACKGROUND

How Katie landed her career
in academia.



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ANIMAL PARTICIPANTS

The challenges and rewards
of comparative psychology



INTERVIEW EXCLUSIVE

"IT WAS VERY IMPORTANT TO ME THAT I KEPT SCIENCE SEPARATE FROM THESE ATTACHMENTS"

Lucy Stafford interviews Professor Katie Slocombe.

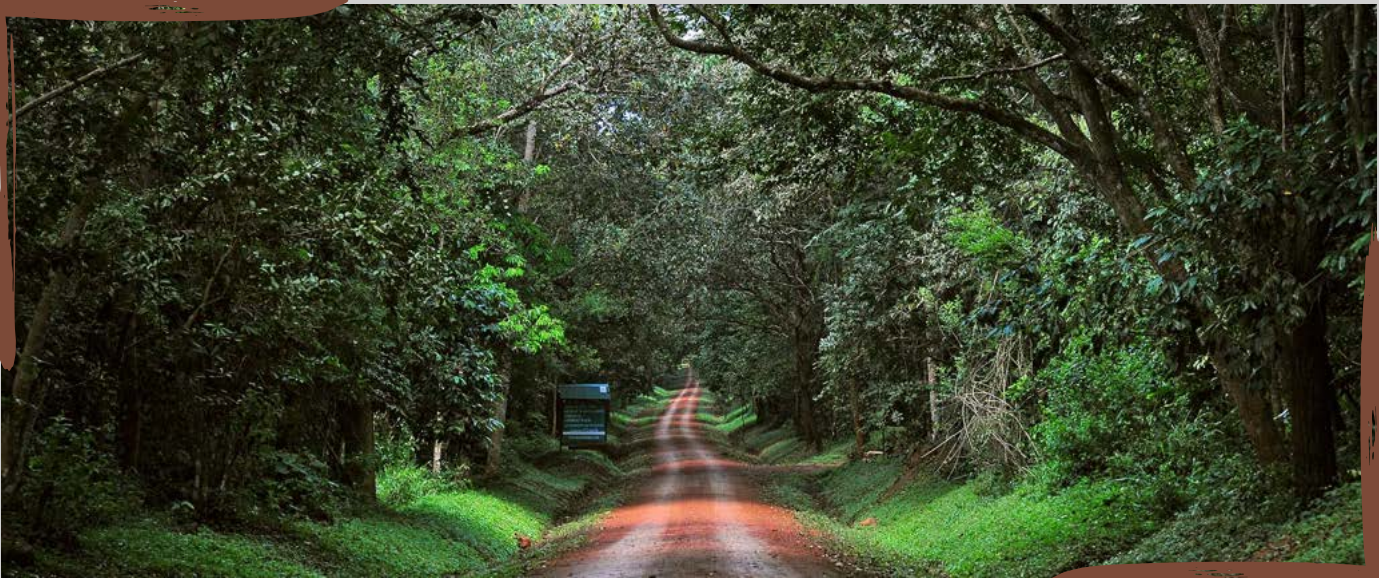
Student motivation can be low this time of year, so it would be great if we could hear a little about your academic background to boost it.

I achieved three A-Levels in English, History and French and then went on to study psychology at the University of Nottingham. After graduating with first class honours in my BSc, I then completed my PhD at the University of St Andrews. My final year research project at Nottingham was about spatial learning in Marmosets, and it was around this time that my supervisor asked if I had considered doing a PhD. I had no idea what a PhD was as Nottingham had given very limited career advice. After finding out that I could essentially receive 3 years of funding for a massive research project, I applied for funding

and secured it with St Andrews University. I had always loved and been successful in my academic work, so a PhD allowed me to pursue my passion for academia.

I completed my PhD on vocal communication in Chimpanzees working with both wild and captive chimps. The wild chimps were based in Uganda and the captive chimps were based in Edinburgh Zoo. I am still heavily involved with the chimps in Edinburgh Zoo and was able to establish a funding stream between the wild and captive chimps.

After finishing my PhD, I wrote a grant with my supervisor to secure funding for postdoctoral research and this was successful. This meant I was able to conduct postdoc research with chimpanzees



to answer some of the questions that had arose during my PhD. During this time, my husband Nick was offered a lectureship in Hull, and so I started searching for a lectureship commutable from Hull. A position came up in York, and I got an interview but not the job. However, I did get a temporary lectureship position. After a couple of years at York I was then successful in obtaining a permanent lectureship.

So, my career in academia was not particularly well-planned. But I think I ended up in academia because I had picked to study a subject I enjoyed, and this meant I worked hard and was successful in it. Choosing to do things you are not only good at but also passionate about is the kind of philosophy that underlies the York Strengths Programme and so I really try and promote the programme to York's psychology students, as playing to my strengths has successfully guided my career path and landed me in a job I love.

You mentioned your teaching role in your previous answer. It would be great if we could learn a little more about that and any other roles you have in the psychology department.

I teach second years in the spring term about animal learning and cognition as part of the perception and cognition strand. I also teach an advanced module on animal communication and cognition for BSc third years and MSci fourth years. I supervise BSc and MSci third year literature surveys, and BSc third year and MSci fourth year research projects. The students I am supervising as part of their third year BSc research projects would usually go to Edinburgh Zoo and work with the chimpanzees, but due to Covid-19, this has not been possible this year. Their research projects are still primate based and are shaping up very nicely. The fourth year MSci projects tend to be based around the developmental research I'm currently conducting. With the current circumstances, my MSci students have had to test three-year-old children over Zoom rather than in person. It has been challenging, for the children and students, but both are doing an incredible job.

Alongside my teaching, I also lead a large research group made up of three PhD students, one postdoc researcher, and many research assistants. We are funded by an ERC grant to look at the origins of joint attention.

I am also the department's employability coordinator. I am part of the university wide employability operations team, but in the department I organise and run sessions to help students with matters such as CVs, personal employability plans and the careers available to them with a psychology degree.

Did you consider any other careers before you discovered a career in academia?

Although I love animals, I realised quite early on that I didn't want to be a Vet. This was because I didn't enjoy chemistry and physics enough to take them as A-levels to get onto a veterinary degree, and I don't think I would have been able to face euthanizing pets.

I also investigated being an animal behaviourist to help people with problem pets. At that time, it was more of part-time job than something that could be done on a full-time basis. It also depended on your connections, so who you know, and your reputation. It would take a long time to build up a good reputation and become associated with veterinary clinics, so it wasn't something that wasn't very feasible for a psychology graduate.

In between the second and third year of my undergraduate degree, I seriously started considering an office-based job. This is because none of the professional psychology routes, while incredibly worthwhile, appealed to me. Personally, I wasn't cut out to deal with clinical patients or prisoners. This led me to consider a career in occupational psychology for a little while until I found out about trademark agents. I thought this would allow me to make use of my A-level in French because it would involve having to write in at least two other languages to get a product through the European trademark process. The tough exams didn't particularly phase me as I'd always enjoyed studying, but I wasn't super enthusiastic about the prospect of an office job.

Once I found out about a PhD, there was no doubt in my mind that this was the right path for me. I did take a huge risk initially with my PhD by agreeing to work with a supervisor I hadn't met before to secure funding, but luckily, we got on brilliantly. His previous research concerned vocal communication in monkeys, and so I was able to adapt the paradigms he had used, to investigate vocal communication in chimpanzees. I was lucky to get some exciting results and be published in some well-respected journals. I worked hard, but I'm very grateful for the luck I've had on my side!

Following an academic path to ultimately get a lectureship also allowed me to fulfil the teaching career I had previously considered. I had enjoyed tutoring my school friends in French, but I had been put off a career teaching in schools by the disciplinary side of it. For me teaching at University level is perfect, because I am teaching students who choose to be there and who want to learn.

Can you tell us about your favourite piece of research that has been published?

My favourite piece of research I worked on was published in 2013 and was about intentionality in the alarm calls of chimps. Studying the intentionality of primate communication is important in understanding how human language evolved. Human language is believed to have a vocal or gestural origin, and this can be resolved by searching for similarities and differences between human language, and the vocal and gestural communication of different primates- chimpanzees in this case. Support for a gestural origin comes from gestures being used intentionally by primates. Contrastingly, vocalisations were not believed to be intentional and instead just regarded as an output of emotion. Our research challenged this by showing that vocalisations, specifically alarm

calls, were intentional at times. This undermined the idea that human language evolved from the gestural communication of primates.

We studied the vocalisations of chimpanzees in the wild when they were alone or with a group. To elicit a vocalisation, we planted a python model in front of a travelling chimp or group of chimps. We had to guess where to plant the python model by predicting their travel paths, but the chimps don't always follow their predicted travel paths, and this meant it took 2 years to collect enough data! We found three different kinds of vocalisations: soft huus, alarm huus, and waa barks. Critically, the alarm huus and waa barks exhibited characteristics of intentionality. This is because these vocalisations were socially directed and given on the arrival of friends, associated with visual monitoring of the audience and gaze alternations, and goal directed, as calling only stopped when recipients were safe from the predator.

These results were meaningful to me because they emphasised the importance of testing over assuming. It was assumed that chimpanzee vocalisations were not intentional, and so the belief that human language evolved from gestural communication in primates prevailed. But when we



searched for intentionality in chimpanzee vocalisations, two out of the three vocalisations met the criteria for intentionality. This highlights how crucial it is to challenge assumptions with scientific testing.

Do you have a favourite animal to research?

My favourite animal to research has definitely got to be chimps. I've spent the most time with them, from my PhD to now. I've worked with other species, but I've just not spent the same length of time with them as I have with chimps. Because chimps are the closest living relative to us, they show some super clever and surprising behaviour. Anecdotal observations of seemingly interesting behaviour in wild chimps have led me to some really interesting findings, once I've figured out how to collect systematic data on these behaviours! Spending time with chimps in their natural environment helps us understand the function of certain behaviours and how these behaviours evolved in the first place. The rate of deforestation across Africa makes me think I could sadly be one of the last generation of researchers to work with wild chimps, so I feel amazingly grateful to have had the opportunity.

Studying captive chimps, such as the ones in Edinburgh and Leipzig zoo I've worked with, has also led me to some really interesting findings. This is because experiments are easier to conduct with captive chimps, and it's quicker to conduct lots of trials. We also get to use some really sophisticated technology with captive chimps that would just not be possible to implement with wild chimps. For example, eye tracking studies have just started to be carried out with the chimps in Edinburgh Zoo.

Have you ever formed an attachment to an animal you've worked with?

I definitely had my favourite wild and captive chimps. Maani was my favourite wild chimp during my PhD research. He was the beta male in the group and had basically got to where he had in the hierarchy through being nice to other chimps. So, through activities such as grooming, he was able to make powerful alliances with other chimps and this solidified his position in the hierarchy. He was also my favourite because he was

was confident around humans. You could be watching another chimp, and turn round to find he'd come and sat about 2 metres from you on the same log. He never flinched around humans and was just super calm. My favourite captive chimp was a young male, Patrick, in Leipzig Zoo. I also got to learn that captive chimps have their favourite humans, I remember a female chimp, Riet, took a particular dislike to me. She would spit at me whenever chance she got!

"I could sadly be one of the last generation of researchers to work with wild chimps, so I feel amazingly grateful to have had the opportunity"





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As scientists we need to ask interesting questions and design rigorous ways of testing them and then interpret the data objectively

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Although I did form personal attachments to the animals I worked with, I never let this interfere with my research. It was very important to me that I kept science separate from these attachments. This meant that I didn't try and prove, through my research, that chimps are particularly clever or human-like. They're fascinating in their own right, regardless of whether they produce statistically significant results! Using comparative psychology to try and prove that your study species is amazing or the most human-like is not good science to me – as scientists we need to ask interesting questions and design rigorous ways of testing them and then interpret the data objectively – having 'an agenda' tends to cloud objective judgements.

What are the most difficult animals you've worked with?

Parrots and corvids are the most difficult animals I've worked with. It's very difficult to get them to perform cognitive tasks. Chimps are easier in that respect because they're so food motivated but the birds were not nearly as greedy! The parrots and corvids were also ridiculously neophobic about certain things - for example, we put a new shelf in the Raven's aviary and they refused to go anywhere near it for several weeks. This meant the testing strategies we'd used for chimps had to be adapted to the neophobic nature of these birds. Because they were unpredictably neophobic, it made it quite difficult to plan how long experiments would take.

An unexpected upside of studying parrots was that they were sensible with regards to what they would eat. When studying chimps, we couldn't give them anything that they

could break in the fear they would ingest the broken pieces. Parrots on the other hand just never attempted to eat non-edible items – much more sensible than the chimps!



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