University of St Andrews
School of Psychology and Neuroscience, and Department of Philosophy

What Kind of Mind?

Lesson 5: Teacher Notes

Lesson 5: Parrots	**Learning Intention: To learn how birds are related to other animals, introduce the idea of convergent evolution, understand the importance of learning through play and how this might be shared with many other species.** **Activity Instructions**	**Purpose**
1	**Recap Lesson 4** **Resources: PP Slides 1-2** **Instructions:** Recap the main points of lesson 4 as follows: Last time we thought about how chimpanzees are our closest living primate relatives. We thought about the similarities and difference in human and chimp hands, feet, faces and vocal apparatus. We then thought about what language is and whether chimps have a language. We tried to communicate without using words. We watched a film about chimp communication and saw the gestures which they use and considered whether this was a language. We then made up our own chimp gestures and tried to use these to communicate different messages to each other.	To reinforce main ideas from previous lesson.

2	**Philosophy – What is Play?** **Resources: PP Slide 3** **Instructions:** Using Slide 3 as a prompt, read the following short stories to the children and pose the accompanying questions. They are being asked to consider whether going through the motions of playing, that is playing without having fun, can be properly considered as playing. Philosophers can imagine scenarios where beings may go through the motions of playing but not have any fun. For example, animals play to learn survival skills and social interaction, but are they having fun when they are doing this? Do they need to have fun when they play? The emphasis here is on getting the children to think more deeply about what play may be and if fun is a necessary part of playing for humans and non-human animals. Stories About Playing: **Kirsty** Once upon a time there was a girl named Kirsty. She lived in a normal house in a street where lots of children lived. She had made many friends on her street. Her mother was always telling her to go out and spend time with the other children in their street. Kirsty did as her mother wanted, and each day went outside with her friends. Kirsty and her friends chased each other; they jumped with a skipping rope; they kicked a football about; they made up stories with toy animals and they built things with construction sets. They tried board games and video games.	To introduce the question of what is play; To introduce the idea that playing is important for the development of human and animal minds.

	However, Kirsty did not enjoy this. She did not have fun. In fact, Kirsty never had fun at all when she did these things with her friends. Do you think Kirsty was playing if she didn't have fun? Do we have to enjoy ourselves to play? **Sanjeev and his Mum** Sanjeev and his mum spent a lot of time together every day after school. Sanjeev's favourite game was Animal Snap. He had a special set of cards with a picture of an animal on each one. Some of the animals on the cards matched and when one of these was placed on top of another, someone had to shout, 'Snap!' and they would win all the cards in the pile. The person who managed to get all the cards was the winner. Sanjeev loved this game and to get all the cards. Sanjeev's mum did not like snap. She did not enjoy it at all and it was not fun for her. However, every day she would have several games of snap with Sanjeev. She smiled but she did not have fun. Do you think that Sanjeev is playing? Do you think that Sanjeev's mum is playing? Do we have to have fun when we play? **Psychology - Playing –** **Resources: PP Slides 4 -5; Film in PP Slide 5. Also here:** https://www.youtube.com/watch?v=UoN2qtdE1YI **Instructions:** **PP Slide 4 -** This slide opens up for discussion the question of why we play. Why do we play? What games do you like to play and why? Is it important to play? Why do you think that? What are we doing when we play? Children are encouraged to think about the purpose and enjoyment of playing. Humans show curiosity about their world when they play. The emphasis here is that humans learn through play and that playing is important for the development of human minds. **PP Slide 5 -** Show embedded film about lion cubs. https://www.youtube.com/watch?v=UoN2qtdE1YI Children are now asked to consider if animals play Do animals play? Give examples. Why might animals play? Why might animal babies play? Discussion could include ideas about play enabling us to find things out about objects and our environment. Very free and open discussion to allow creative thinking. The slide shows Velu, a four-year-old chimpanzee at Edinburgh Zoo, playing with a red box. Animals also seem to show curiosity about their world when they play. Again, here the emphasis is that animals learn through play and that playing is important for the development of animal minds. Different animals play in different ways. Physical or 'locomotor' play can help young animals develop muscles and	

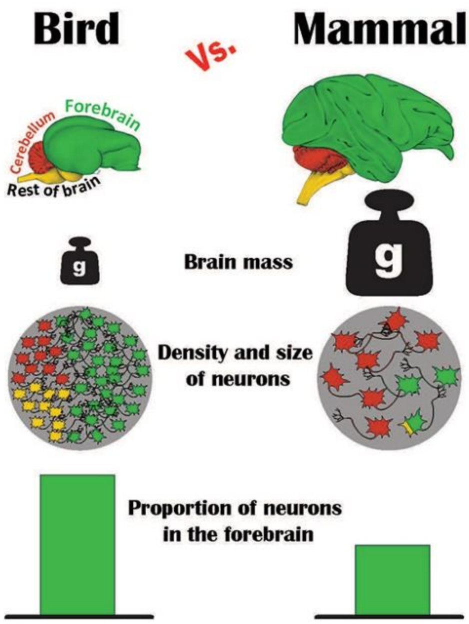
	reaction times, social play can help them learn how others react, and object play might help them to learn how objects behave.	
3	**Philosophy – Are you curious?** **Resources: PP Slide 6-7; Worksheet – Classroom Quest** **PP Slide 6:** Do you ever wonder about things? Do you ever wonder about things you don't know? What do you do when you wonder? Do you wrinkle your brow? Do you widen your eyes? Are you wondering about wondering right now? Have a look around at everyone's faces. What do they look like? What do you feel like when you are wondering? What do you think your mind is doing when you are wondering? The human mind has an amazing super power: it can be aware that is does not know something! Can you think of something you don't know? What is that? How can your mind know that it does not know something? When you are wondering, your mind is in a state of curiosity. Curiosity is a strong feeling or a wish to know something. The Scottish philosopher David Hume once described curiosity as, 'that love of truth, which was the first source of all our enquiries'. So, Hume is saying that philosophers like to find out the truth about things and that this whole process begins with being curious. It begins with wondering about things. When we are curious and wonder about things, we ask questions. Curiosity and wondering are the motivators for asking questions: they force us to ask questions. We ask questions in order to find out what we desire to know. Curiosity is the driving force behind research in science, technology, engineering, philosophy, psychology and even areas such as art or music. Are we only curious so that we can gain knowledge? When we play or do a puzzle, we are being curious, but we don't do it just for the knowledge. Curiosity also drives us to have new experiences, such as trying a new kind of milkshake. We enjoy being curious. So maybe being curious and wondering are really valuable qualities of the human mind. **PP Slide 7: Classroom Quest** **Instructions for Worksheet:** The children are asked to communicate with others in the class to complete the questionnaire. They also have to record how they found out this information. Did they ask someone? Did they have to look it up somewhere? Did you enjoy that? Why was it fun? What have you learned? What is the most interesting thing you have learned?	To think about the qualities of being curious and wondering as being valuable in the human mind.
4	**Psychology: Parrot Evolution –** **Resources: PP Slide 8 - 10** **PP Slide 8 -** This phylogenetic tree shows that our common ancestry with parrots is much further back than with chimps or orangutans. Parrots are birds: birds are the only living group of dinosaurs! Our common ancestor was something like a lizard.	To illustrate the evolution of birds, their bodies and their brains.

	PP Slide 9 – This slide shows an illustration of the way birds may have evolved from dinosaurs. The film clip explains this further. https://www.youtube.com/watch?time_continue=6&v=eaWb0UUNc00 Dinosaurs to birds **PP Slide 10 –** This slide provides some facts about parrots. Parrots have no hands, which is very different to humans; they interact with their world with their beaks and feet. Their vision is much better than ours – they can see UV light. This links back to our exploration of how bats negotiate the world and how they perceive the world differently. Bats 'see' in the dark by using echolocation. Parrots can see ultra violet light. This gives them a different perception of the world. Ask the children what it might be like to see ultra violet light. The picture of the two parrots illustrates this. **PP Slide 11 -** How might birds think? Their brains are much smaller than those of primates, but they have a greater density of neurons. Neurons are the cells that make up the brain. Birds are distant relatives to humans, but some species may have evolved dense brains (lots of brain cells) *convergently*. Convergent evolution is the process where different species independently evolve similar characteristics, without being closely related. For example, both finches and chimpanzees have evolved to use tools, even though these species are not closely related on the evolutionary phylogenetic tree. **PP Slide 12 -** This slide gives infomration about the function of neuron cells in the brain. Neurons are important for intelligence. Parrots have small brains in comparison to primates, but they have a greater density of neurons within those brains. Having denser neurons enables their brains to carry out more complicated processing of information.	
5	**Parrot Neurons** **Resources: PP Slide 13; Worksheet – Bird Brains** **Small Group Activity:** **PP Slide 13 -** illustrates the group activity whereby the children will try to pack 'neurons' into a 'skull'. More than two groups can be used for this activity, but the packing technique should be alternated amongst the groups. Each piece of paper represents a neuron: the cup represents the skull. The groups have instructions to pack the paper in a certain way, as follows: Group 1: Each piece of paper has to be folded one at a time going into the cup. Group 2: Each piece of paper has to be scrunched up one at a time going into the cup.	To think about how many neurons we can pack into a space.

	Whichever method is used, all pieces of paper must be put into the cup in exactly the same way. The cup cannot be overflowing. Each group should record their findings on the worksheet. At the end of the task, the number of pieces of paper should be counted and recorded. The groups will then compare their findings	
6	**Are parrots curious?** **Do parrots wish to find things out about the world? Can parrots play with objects?** **Resources: PP Slide 14 - 15 with film embedded** Also here: https://www.dropbox.com/sh/ae2l6f4wb6vusbr/AAC0Y4FYJNNc0zBi-efsc45la?dl=0&preview=Parrots.mp4 **PP Slide 14 - Whole Group Discussion: Class Poll –** Show of hands to establish base line response to the question at the beginning of the film. Show the film of the Vasa and Kea parrots with the blocks. Discussion about whether parrots can learn about objects through play. How would the parrot know which block to use? Could it just have been lucky? The researchers used the scientific method - unlike in the film, the birds had lots of trials. **Class Poll again at end of discussion –** Are Parrots curious? Have you changed your mind about this? **PP Slide 15 – Scientific Method** This slide demonstrates how the experiment with the parrots can be mapped onto the scientific method. It gives the hypothesis which the researchers tested with the parrots.	To demonstrate the intelligence and learning capabilities of parrots. To think about whether parrots may be curious.
7	**Plenary** **Resources: PP Slide 16 - 17** **PP Slide 16** - Different animals play in different ways. Physical or ‘locomotor’ play can help young animals develop muscles and reaction times, social play can help them learn how others react, and object play might help them to learn how objects behave. **PP Slide 17 -** Playing is important for learning; Curiosity is helpful for learning and survival; parrots are curious; parrots may learn through play like humans. Birds are distant relatives, but some species may have evolved dense brains (lots of brain cells) *convergently*. Convergent evolution is the process where different species independently evolve similar characteristics, without being closely related. For example, both finches and chimpanzees have evolved to use tools, even though these species are not closely related on the evolutionary phylogenetic tree.	To recap the main points of the lesson.

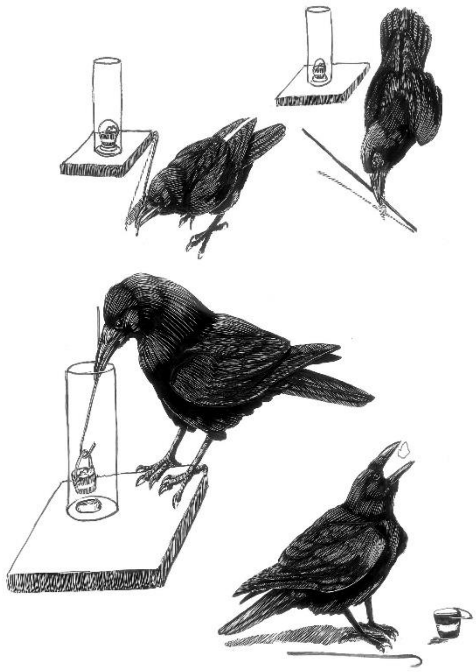
A Brief Guide to Bird Intelligence

While primate intelligence has been the subject of much investigation, recent research has shown that great apes are not the only animals to possess powerful minds. Birds such as corvids (a genus which includes crows, ravens, rooks, and magpies) can apply logical reasoning to solve complex problems, use tools, and understand their positions within social hierarchies. Parrots can mimic a variety of sounds, including human speech, demonstrating advanced imitation-based learning. This guide will outline some of the research conducted into the subject of bird intelligence, as well as how the cognitive capabilities of birds can inform our perspective on the potential abilities of non-primates.



Many of us have heard the phrase ‘bird brained’, which is often used to describe someone of less-than-average intelligence. It is true that bird brains are small, much smaller than those of primates, and that they are organised differently. However, the individual neurons in some bird brains are more densely packed together than primate neurons, meaning that their brains contain more neural material per cubic millimetre. They also contain more neurons in their forebrains, which specialise in things like problem solving, planning, and advanced reasoning. This explains why some types of birds can engage in very complex behaviours while still having small brains. Thus, intelligence may not be about absolute brain size, but also about a brain’s density and connectivity.

So, given that some bird species have brains capable of high-level cognition, what can they actually do?



One of the things we may think about in considering what makes primates intelligent is our ability to make and use tools. Humans use tools to complete thousands of different activities each day. Crow species found on the Pacific island of New Caledonia have also been found to engineer their own tools in order to extract insects from small holes in trees. By twisting twigs into hooks, and modifying them as needed, New Caledonian crows demonstrate the ability to innovate and use the materials around them to solve problems.

British and American crows also show remarkable levels of intelligence, which allows them to flourish in human-dominated landscapes. In 2010, a researcher named John Marzluff found that crows can even recognise individual human faces and tell other crows which humans should be avoided. In his experiment, Marzluff and two of his students wore rubber caveman masks and walked through their university campus in Seattle, trapping a few crows for a brief period of time. After they had released the crows, the researchers walked through the campus again to see how members of the local group of crows would react. Unsurprisingly, many crows proceeded to loudly scold them, even when they wore hats to partially conceal the masks. When the researchers returned with the masks two years later, however, something fascinating happened—even *more* crows scolded them, indicating that during that period of time, the crows that had been trapped initially warned others of the dangerous cavemen. This shows us that crows can not only identify individual human faces, but also remember which humans are untrustworthy and communicate that information to crows who had not witnessed the initial incident. This experiment shows that crows, while being relatively common, show an uncommon aptitude when it comes to facial memory and social communication.

A 2004 study also found that pinyon jays, a corvid species found in North America, can use logic to judge where they lie in a social hierarchy. These birds congregate in social groups containing hundreds of individuals, so it is useful to be able to judge one's position relative to other jays. To do this, pinyon jays employ advanced cognitive processes to logically deduce their standings, using an abstract mental process called transitive inference. Humans use similar processes to engage in logical reasoning and solve mathematical problems, something we used to think was unique to our species. Birds' brains may be small, but they can store tons of information, using it to navigate their way through a world defined by social roles and experiences.

Parrots also demonstrate high levels of intelligence. Alex, an African Grey Parrot and the subject of a thirty-year study in Harvard's Pepperberg Lab, showed just how capable birds are of learning through imitation, communicating, and using tools. At five years of age, Alex was able to identify the functional use of about 40 different English words—meaning that Alex could identify objects presented by his human caretakers by actually saying what they were. Amazingly, he also learned the meaning of words like 'no', often saying it if he did not wish to be handled by his carer, or if he was unsatisfied with what he thought was an insufficiently-sized piece of food. By the end of his life, Alex also learned how to string together basic combinations of words in order to communicate in higher detail. For instance, he began to identify green clothing pegs by saying "green peg wood", using adjectives in his speech. While this does not reflect the use of grammar, Alex's abilities greatly changed the ways in which we think about avian intelligence. Interestingly, Alex is also the first non-human animal we know to have asked an existential question after being placed in front of a mirror:

"What colour [am I]?".

Birds like corvids and parrots show us that intelligence is expressed across the animal kingdom, and that the origins of intelligence vary across species. We share a close common ancestor with other primates, but this is not the case with birds—their intelligence developed along different evolutionary lines, supported by a different neurological structure in a different ecological context. There is much to still be learned about bird intelligence, but one thing is certain: the more we discover about their cognitive abilities, the more we can appreciate the diversity and capacity of animal minds.