



## BIOLOGY UNIT OF STUDY 2

■ YEAR 12 ■ NCEA AS91153 ■ LEVEL 2.1 ■ DURATION 2-3 weeks

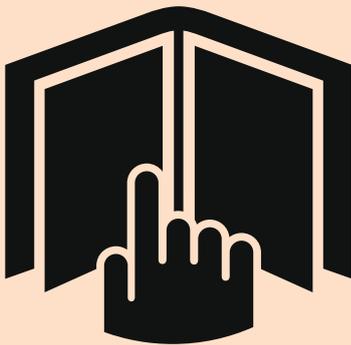
Supports internal assessment for Achievement Standard 91153  
Carry out a practical investigation in a biology context, with supervision

### A LESSON IN COGNITIVE ETHOLOGY



# Do Animals Play Fair?

A non-invasive behavioural study



### TEACHER GUIDELINES

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource. These teacher guidelines do not need to be submitted for moderation.

### CONTEXT/SETTING

Students are expected to carry out an **investigation of life processes**, in this instance cognitive ethology (the broad biological study of cognitive processes). Well-known cognitive ethologists include Dr Jane Goodall (chimpanzees) and Dian Fossey (gorillas). This investigation will look at **reciprocal play patterns and behaviours** in dogs, kea or kaka. The investigation will discuss how reciprocal play processes illustrate a survival advantage. There is an extension exercise on how this survival advantage can lead to moral development in animals.

Students will need to have had considerable practice at developing investigations. In regard to developing their investigation and collecting data they will need to know how to plan, carry out, process and interpret data. In regard to writing their report they will need to know how to develop a conclusion, discuss biological concepts and processes relating to the investigation (i.e. what the investigation showed about the concept or process), and evaluate the investigation.

This investigation involves the assessment of a pattern or relationship (EN 5).

**SUPERVISION:** Parts 1, 2 and 3 all provide opportunities for the teacher and student to discuss and clarify the student's ideas about the investigation (EN 6). Supervision can be written or verbal, and can occur at checkpoints or milestones when the work in progress is handed in or it could occur through general discussion with the class and with individuals.

It is expected that students will work through the complete investigation process and will have the opportunity to make changes to their initial method as they carry out the investigation (EN 4).

### CONDITIONS

This is a practical activity that will be carried out both in the field and in the laboratory. Students will need **approximately two hours** to plan, trial and develop a method for their investigation. Students will need **approximately three hours** to collect primary data and a further **two to three hours** to process the data and write a report (although this will depend on the type of animal studied and location of the investigation).

This assessment activity is to be carried out in three parts that lead to the production of an investigative report.

The specific conditions (equipment and materials required) are stated on the student instruction sheet.





## RESOURCE REQUIREMENTS

Equipment and materials required:

- Video camera
- Videotape
- Tripod
- Movie software (Movie Maker for PC or iMovie for Mac)
- Cell phone (with video)
- Computer
- Access to animals (dogs, kea, kaka) at play (dog park, animal shelter, ski field, national park, etc).

## ADDITIONAL INFORMATION

Health and safety procedures and compliance with the Animal Welfare Act 1999 must be adhered to (EN 2).

During the teaching and learning of the investigation procedures related to Year 12 Biology, examples of Achieved, Achieved with Merit and Achieved with Excellence reports should be gathered and annotated to highlight evidence that meets the standard. The annotations should be developed through consultation with other Year 12 biology teachers and the reports kept for future reference.

To gain merit and excellence, students need to **discuss and evaluate** the investigation. In the discussion they need to show understanding and recognition of key play-soliciting and anti-social behaviours. They need to show understanding by discussing how and why these behaviours occur and how they ensured that the method they used was **valid and reliable** – i.e. how sources of errors were minimised and limitations overcome, how bias (the lack of objectivity when carrying out the investigation) was removed and how they know they gathered sufficient data (EN 9).



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## THE INVESTIGATION

### PART ONE

#### Develop a Plan/Method

The student is provided with a *Planning Sheet* (p. 29) and will work independently or in pairs to complete this.

The student should be given the opportunity to conduct trials to develop their method, and to establish the sample selection for pattern seeking. A record of this trialling needs to be outlined on the *Planning Sheet* or in the final report.

The student uses the *Planning Sheet* and trial results to write a detailed, step-by-step method. The *Planning Sheet* (or other check sheets) may be used to self-evaluate whether the method is workable.

### PART TWO

#### Collect and Record Data

The student follows their written method as they proceed to collect their own data. The method may be modified, but these modifications must be recorded in their final report and indicated to the assessor. The student must process the data collected in a form that shows a pattern or trend or the absence of either. This may be achieved by averaging, using a table or using a graph.

### PART THREE

#### Present a Report

The student, working independently, presents the report of the investigation following the directions/format given in the student instructions.

### GUIDE TO NON-INVASIVE ANIMAL STUDIES

This behavioural study unit looks at animal play in both domestic and wild animals. The beauty of this particular unit of study is that all we need to do is observe the animals in as unobtrusive a manner as possible. In fact, the more 'invisible' we are, the more likely the animals will relax and behave in a natural manner. Domestic dogs are familiar with the presence of humans and as a consequence are usually natural, comfortable and at ease playing around us.

The purpose of including this lesson on animal behaviour is to illustrate that it is possible to investigate, study and, as a consequence, learn about animals in a non-invasive way. Wild kea and kaka might be a little more shy and difficult to get close to (although kea are famous for their cheeky antics!). To learn more about the importance of minimising or even eliminating human intrusions when studying animal behaviour, see the extracts from Marc Bekoff's book *The Emotional Lives of Animals* on pages 103-119 of *Animals in Science*.





Achievement Criteria		
AS91153 (Biology 2.1): Carry out a practical investigation in a biology context, with supervision.		
ACHIEVEMENT	ACHIEVEMENT WITH MERIT	ACHIEVEMENT WITH EXCELLENCE
<p>Carry out a practical investigation in a biology context, with supervision.</p> <p>The report shows the development and carrying out of an investigation.</p>	<p>Carry out an <b>in-depth</b> practical investigation in a biology context, with supervision.</p> <p>The report shows the development and carrying out of a <b>quality</b> investigation.</p>	<p>Carry out a <b>comprehensive</b> practical investigation in a biology context, with supervision.</p> <p>The report shows the development, carrying out and <b>evaluation</b> of a <b>quality</b> investigation.</p>
<p>The report includes:</p> <ul style="list-style-type: none"> <li>• <b>Purpose</b> of the investigation (explicit) describing how reciprocal play processes illustrate a survival advantage.</li> <li>• A <b>method</b> that includes a description of the range of data to be collected for each animal, how samples and sample size will be decided and how other variables will be measured.</li> <li>• Collecting, recording and processing of data <b>relevant to the purpose</b>:               <ul style="list-style-type: none"> <li>- construction of an ethogram</li> <li>- data processed in a way that allows a trend or pattern to be determined.</li> </ul> </li> </ul> <p><b>Reporting on the findings</b></p> <ul style="list-style-type: none"> <li>• Conclusion reached based on the processed data in relation to the purpose of the investigation.</li> </ul> 	<p>The report includes:</p> <ul style="list-style-type: none"> <li>• <b>Purpose</b> of the investigation (explicit) describing how reciprocal play processes illustrate a survival advantage.</li> <li>• A <b>method</b> that includes a description <b>and explanation</b> of a <b>valid</b> range of data to be collected for each animal, how samples and sample size will be decided and how other variables will be measured.</li> <li>• Collecting, recording and processing of data <b>to enable a trend or pattern to be determined</b>:               <ul style="list-style-type: none"> <li>- construction of an ethogram</li> <li>- data processed in a way that allows a trend or pattern to be determined <b>and interpreted</b></li> <li>- accurate calculation of results in a table, graph or calculation of averages.</li> </ul> </li> </ul> <p><b>Reporting on the findings</b></p> <ul style="list-style-type: none"> <li>• <b>Valid</b> conclusion reached based on the processed data in relation to the purpose of the investigation.</li> <li>• Discussion uses knowledge of play processes and behaviours to explain the trend or pattern in the results.</li> </ul>	<p>As for Achievement with Merit.</p> <ul style="list-style-type: none"> <li>• <b>Evaluation</b> of the investigation by justification of the conclusion in terms of the method used by considering EITHER the reliability of the data OR the validity of method. For example, sufficient data, appropriate range of IV, appropriate processing using ethograms and graphs, minimisation or removal of sources of errors, limitations, bias.</li> </ul> 



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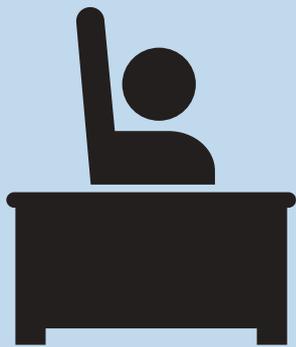
Carry out a practical investigation in a biology context, with supervision

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# Do Animals Play Fair?

A non-invasive behavioural study



### STUDENT INSTRUCTIONS

In this assessment you will carry out an investigation of life processes, in this instance cognitive ethology (the broad biological study of cognitive processes). Famous cognitive ethologists include Dr Jane Goodall (chimpanzees) and Dian Fossey (gorillas). This investigation will look at reciprocal play patterns and behaviours in dogs, kea or kaka. The investigation will discuss how reciprocal play processes illustrate a survival advantage. There is an extension exercise on how this survival advantage can lead to moral development in animals.

You will develop a method; collect, process and interpret information; and present a report on play behaviour in animals.

The assessment has three parts plus an optional extension exercise:

PART ONE: Develop a Plan/Method

PART TWO: Collect and Record Data

PART THREE: Present a Report

EXTENSION EXERCISE (optional)

## PART ONE

### Develop a Plan/Method

Use the information in this section (Part One: Develop a Plan/Method) to help you fill in the planning sheet provided (see page 29).

Before you start planning, take a look at some of the suggested reading texts on page 33. Reading through these extracts will assist the planning of your investigation.



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## 1. Purpose of investigation – Do animals play fair?

You are to develop and carry out an investigation into life processes that explains how and why reciprocal play behaviour is a valuable survival adaptation. As an extension exercise you may also consider how this type of play behaviour leads to moral decision making and development in animals.

In this investigation you will explore play behaviour in dogs, kea or kaka. You will learn how to collect and analyse behavioural data from animals engaged in play.

### 1. (a) Preparation of investigation question (purpose of investigation)

Some examples of testable questions that you could research include, but are not limited to:

- Which behaviours are used most consistently to solicit play?
- Do animals that engage in high rates of offensive play behaviour (e.g. chasing, forcing partner down) initiate play with more or less frequency than those that play without (or with fewer) offensive behaviours?
- Do animals show a preference in their play partner?
- Is there a temporal pattern underlying any of the play behaviours? For example, do 'play bows' in dogs always occur at the beginning of play interactions or are they distributed throughout the play bout?

- What proportion of bites are immediately followed by a 'play bow' in dogs?
- Do kea primarily 'play' in groups or in pairs?
- Does play attract others?
- What proportion of play bouts leads to episodes of play fighting in kea?
- Does the variety of the displayed play repertoire increase significantly with bout length (e.g. the longer the play bout, the greater the variety of play behaviours)?
- What proportion of play interactions in kea begins with a hopping approach or head cock?

Use different combinations of the following contrasting features to form your question for the investigation: male/female, larger/smaller, younger/older. For example:

- Do females or males self-handicap more regularly?
- Do females initiate play more regularly with larger or smaller animals?
- Do younger animals show higher rates of aggressive behaviour in comparison with older animals?
- Do smaller dogs solicit play more frequently than larger dogs?

There are many more potential questions that you could investigate. Have a look at the suggested reading if you are stuck for ideas.

It is usual scientific practice to make initial observations before forming hypotheses. From the observations you will develop tentative answers to questions (hypotheses), which will enable you to make predictions. Testing your predictions gathers results that either support or oppose your hypothesis. Testing predictions also gathers new observations that can be developed into new hypotheses for future research.





## 2. Data collection for pattern seeking

Pattern seeking involves observing and recording natural events, or carrying out experiments where the variables can't easily be controlled.

In pattern seeking, it is important to note and record variables. The investigator needs to try to identify patterns that result from these variables.

Once a pattern has been observed this may lead to other investigations in an effort to try to explain why a particular pattern occurs, and to a classifying and identifying system.

Source: [www.tki.org.nz/r/science/science\\_is/teaching\\_science/types\\_investigation\\_e.php](http://www.tki.org.nz/r/science/science_is/teaching_science/types_investigation_e.php)

### 2. (a) What/who are you going to observe?

The next stage of the investigation involves deciding what **type of animal** you intend to investigate:

- DOGS
- KEA
- KAKA.

### 2. (b) How/where will the observations occur?

Record the location where you intend to film your chosen animals playing.

Some suggestions include, but are not limited to:

- Dog park (dogs)
- Dog shelter (dogs)
- Boarding kennel (dogs)
- Beach (dogs)
- Your home/farm (dogs)
- Arthur's Pass (kea)
- Ski field car park (kea)
- Wildlife sanctuaries (Zealandia, Pukaha Mt Bruce, Little Barrier Island, Kapiti Island) (kaka)
- Some national parks (kea, kaka).

Also record if you will use different locations or make return visits to the same location over the course of your investigation.

### 2. (c) How many observations will you need to take to get reliable data?

A play bout that only lasts for a couple of minutes contains a surprising amount of information when viewed frame by frame. Aim to record as many play bouts as practical within the time constraints.

NOTE: If you spend more than three hours filming and fail to get any usable footage, you can resort to using the footage on the DVD provided with this resource.

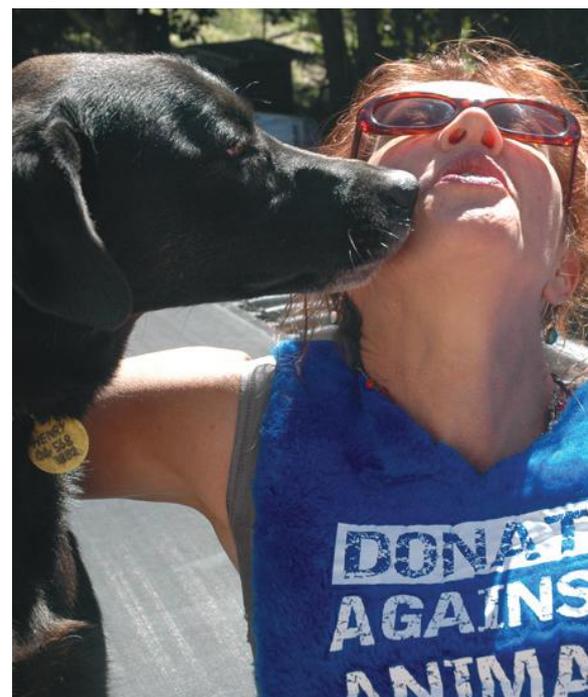


## 3. Other factors that could influence the investigation

A range of factors can influence play behaviour. For instance, some ethologists suggest that play happens more often at certain times of the day. You can control this factor by scheduling your filming for the same time each day. Another factor that you need to take into account is the mitigating factor of human presence. Some subject animals may behave differently in the presence of people or become fixated on people. On occasion, animals react to subtle cues given by people. One author controlled this variable by blindfolding the humans, but this may be inappropriate for your investigation. For your study you can control human influence by politely asking people to ignore the animals you are filming.

## 4. How will you ensure that your results are reliable?

When more than one person is analysing the film footage, it is a good idea to test observer agreement. Watching the same footage without the other observer(s) present and filling in the results sheet achieves this. Comparing the two results following the observation will generate observer agreement.





## 5. Extraneous notes from your trials

Be sure to make a note of any extraneous results from your trials to include in your report.

Extraneous results are those unexpected or unrelated results that have occurred but fall outside the scope of your investigation.

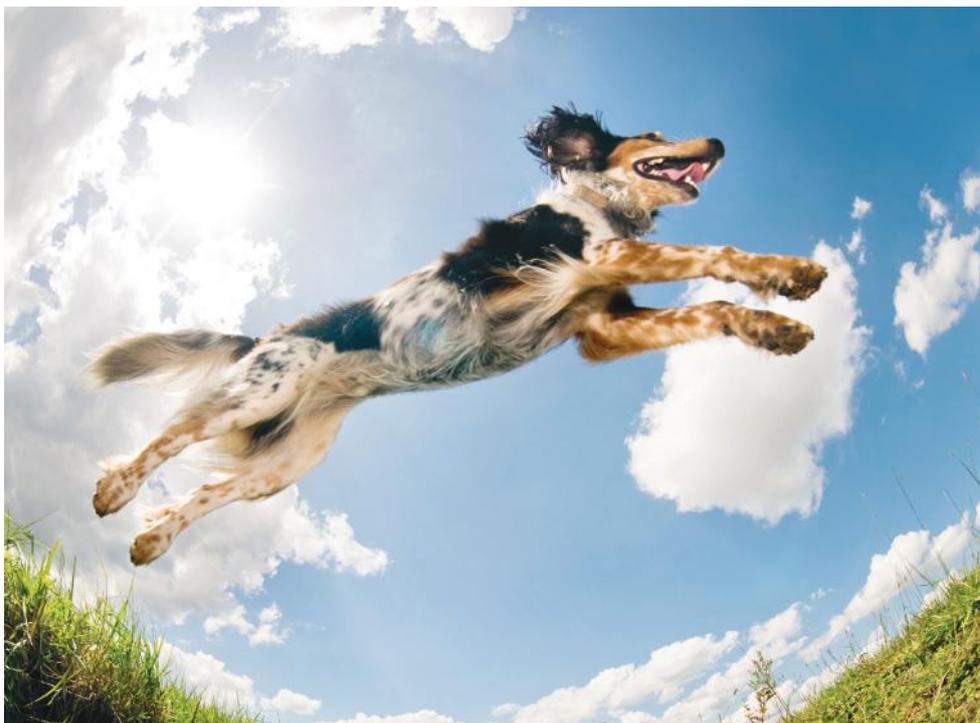
NOTE: Extraneous results are only worth mentioning if they in some way interfered with your investigation.

## 6. Method

Develop a method to investigate reciprocal play behaviour in dogs, kea or kaka.

Your method should state:

- the purpose of your investigation (an explicit testable question, prediction or hypothesis, or an aim) in relation to reciprocal play behaviour
- the range of data to be collected (which animals, and specific information about the individual animals – i.e. species, sex, age, size, etc)
- how the data will be collected for each animal (or play bout)
- how animals will be chosen and the number of play bouts decided upon



- how other variables and factors that could have a significant impact on the investigation will be measured or observed (i.e. interference from people or other factors)
- the equipment needed
- how the results will be checked to see if they are accurate, valid and reliable.

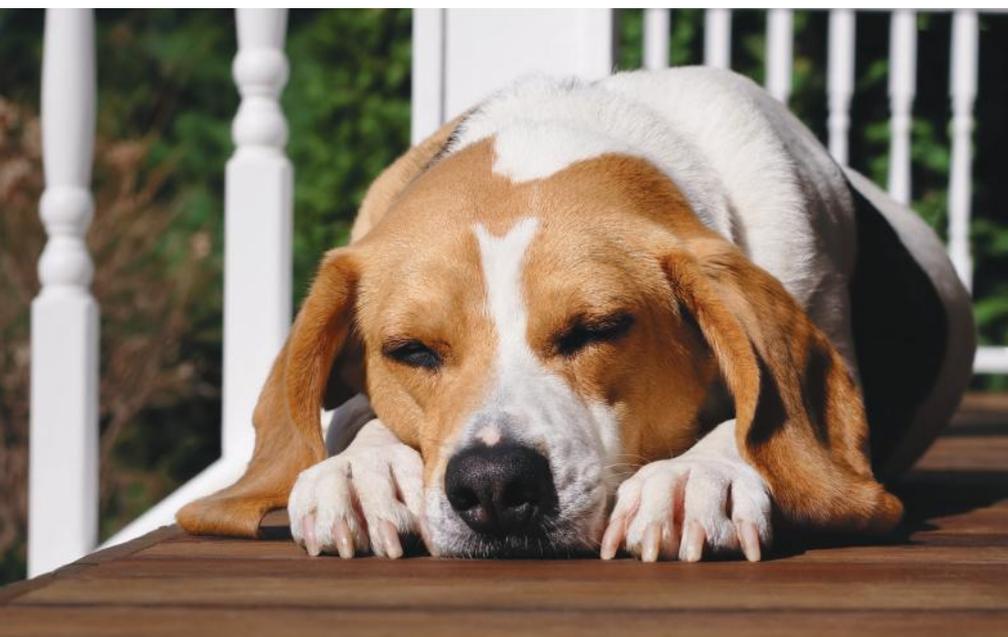
You may have to trial aspects of this initial method to ensure that it is workable.

Write up a step-by-step method that someone else could follow. Check that your method includes all the information listed in the bullet points above and that it provides data or information relevant to your hypothesis.

This investigation will require you to record instances of play on video and analyse the footage frame by frame. Have a look at Bekoff, *Play Signals as Punctuation* and Diamond and Bond, *Kea, Bird of Paradox* and *Social Play in Kaka* in the suggested reading on page 33 for examples of methods using the filming of play behaviour.

You will need to construct an ethogram before you start analysing the film footage. An ethogram is a list of behaviours with corresponding descriptions. Examples of ethograms for dogs and kea are given below (on pages 31-32) for you to model your own ethogram on.

It is also useful to construct a results table for simplified collection and analysis of film footage data. An example of a results table is also given (on page 30).





## DO ANIMALS PLAY FAIR? – PLANNING SHEET

Student name: \_\_\_\_\_

**1. Purpose of investigation** (this may be an aim or a testable question, prediction or hypothesis)

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**2. Pattern seeking**

(a) What/who are you going to observe?

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(b) How/where will the observations occur?

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(c) How many observations will you need to take to get reliable data?

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**3. Other factors that could influence the investigation** that you intend to take into account.

Describe how this will be done.

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**4. How will you ensure that your results are reliable?**

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**5. Extraneous notes from your trials**

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**6. Method** (this may become your final method that you will use for your report)

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**7. Changes made to method**

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Now use the information on your planning sheet to write a detailed step-by-step method that you intend to carry out over the course of your investigation.



## PART TWO

### Collect and Record Data

**1. Carry out** your investigation, recording any changes that you make to your initial method developed in Part One.

**2. Record** data and observations relevant to your investigation in an appropriate way.

- Construct an ethogram using the data gathered on the animal you have chosen to investigate. Examples of ethograms are provided (on pages 31-32).

**3. Process** your data to produce results that can be compared directly with each other – i.e. to enable a trend or pattern (or absence) to be determined.

- Follow your method to collect data and record the results in a table or another appropriate way. A sample results table can be found below.

**4. Graph** the processed data in a way that allows you to interpret the trend in the data.

- This will usually involve some calculations (e.g. averages) and/or a graph. Look at the table below for an example of how to do this.
- Remember to record any changes to your method as you go. Changes or modifications will often enhance your scientific method and results.
- Record any action or alteration that you carried out to make sure that your method was valid and produced reliable, accurate results (this information could be used in your evaluation).



### Sample Results Table

Results Table for Kea Behaviour Experiment

Time	Behaviour																											
	BA	HC	WF	FP	HA	HP	JP	BL	MO	MJ	SS	RO	TS	CH	TW	HU	AP	WI	CR	JF	JC	SD	WH	AL	FL	VO	WH	
0.02		x																										
0.03			x																									
0.04	x																											
0.12						x																						
0.13								x																				x
0.25							x																					
0.26						x																						
0.35		x																										
0.36										x																		x
0.39		x																										
0.42							x																					
0.45										x																		
0.51											x																	
0.53		x																										x
0.56								x																				
1.05												x																
1.06										x																		
1.08							x																					
1.11							x																					
1.15				x																								x
1.17		x																										
1.23										x																		
1.24																												
1.25																x												x
1.26																												
1.27																	x											
1.29																					x							
1.31																						x						
1.32																												
1.33																												
Total	1	4	1	1	0	2	4	2	0	4	1	1	0	0	0	1	1	0	1	1	1	0	0	0	0	0	5	0

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## ETHOGRAMS

## ETHOGRAM FOR DOGS

Behaviour	Code	Description
Bow	B	Crouching on forelegs and elevating hind legs
Exaggerated approach	EA	Approaching in a 'loose bouncy' gait at a speed greater than observed during normal walking; the shoulders and head are frequently moved from side to side
Approach/withdrawal	A/W	Approaching then withdrawing
General movements	GM	Includes movements of the head and eyes, such as head tossing and eye rolling, and also body movements such as shoulder swaying
Face pawing	FP	Extension of one of the forelimbs towards the face of the other animal
Leap-Leap	LL	Two high-amplitude leaps in which the forelimbs are lifted off the ground and hit the ground simultaneously
Barking	Bk	Barking directed at the play partner
Chin rest	CR	Resting chin on play partner
Face lick	FL	Licking directed at the face
Inguinal response	IR	Remaining passive during groin contact and genital investigation by play partner
Standing over	SO	One individual places their forepaws on the shoulder or back of another animal and incompletely or fully extends the forelegs
Rolling over	RO	Rolling over on the back and exposing abdomen
General-body bite	GB	Biting directed at the body
Leap	L	One leap in which both the forelimbs are lifted off the ground and hit the ground simultaneously
Tail wag	TW	Wagging tail
Approach	A	Dog moves nearer to play partner
Tail-wag approach	TWA	Wagging tail while approaching play partner
Head shake	HSh	Shaking head from side to side
Hip slam	HS	Shoving hips into the body of the play partner
Scruff-bite intension	SBI	Incomplete biting directed at the back of the neck
Scruff bite	SB	Biting directed at the back of the neck
Face-bite intension	FBI	Incomplete biting attempt directed at the face
Face bite	FB	Biting directed at the face
Mouthing	M	Chewing or gentle biting without closing the mouth tightly
Stalking	ST	One animal slowly circles their play partner and then slowly, stealthily approaches
Chasing	CH	One animal pursuing the other with the apparent intent to catch
Face bump	FBp	Charging and pushing face into play partner

## ETHOGRAM FOR KEA

Behaviour	Code	Description
Bite attempt	BA	Using the bill to grab some part of another individual
Head cock	HC	Turning head on one side while looking at or approaching another in play
Wing flap	WF	The wings are opened and flapped as in flight several times, the legs are stretched and the body is held almost vertical
Foot push	FP	Using the feet to push play partner
Hang	HA	Hanging upside down from a branch using feet or bill
Hop	HP	Moving to or from another bird along the ground using both feet simultaneously in short bouncy movements
Jump	JP	One bird jumping; includes jumping over the play partner, and sometimes in the air next to the play partner
Bill lock	BL	Locking, pulling, pushing, wrestling and twisting using bills
Manipulate object	MO	Bird picks up small object such as pieces of paper or small rock
Mutual jumping	MJ	Both birds jumping
Standing on stomach	SS	One bird jumps on the stomach of a bird in a supine position
Roll over	RO	Bird rolls its entire body over and lies on its back and waves its feet in the air
Toss	TS	Bird holds an object in its bill and then jerks its head vertically, releasing the object in the air, sometimes in the direction of the play partner
Chase	CH	One bird pursuing another
Tug-of-war	TW	Bird trying to grasp an object with its bill that is already being held by play partner and both tugging to claim object
Hunch	HU	Posture in which the head is directed downwards and the body is crouched; feathers are fluffed and the tail is fanned out





## KEA INFORMATION

### How to recognise a juvenile kea

Juvenile kea have bright yellow eyelids, cere and beak. Their crown feathers have a yellowish tinge to them. Fledglings typically acquire their adult plumage at around 18 months of age, although it can take up to four years for juvenile kea to lose the yellow around their eyes.

### How to differentiate between males and females

The only visible distinction between the sexes is their beak, with the male kea possessing a larger, longer, curving upper beak. Males, who average around 48cm in length, are also slightly larger in general than females and on average 5% heavier, with bill length and curvature about 14% more than their female counterparts. However, a light male can weigh less than a heavy female.

Females have a distinctly shorter and less curved bill.

Source: [www.avianweb.com/keas.html](http://www.avianweb.com/keas.html)

## PART THREE

### Present a Report

Write a well-organised report on your investigation that includes:

- The **purpose** of the investigation (e.g. explicit aim, testable question or hypothesis) in relation to the concept or process you investigated).
- The **final step-by-step method** used in the investigation.
- **Recorded measurements** (including units) and observations.
- All **data processed** in a way that allows you to determine a trend or pattern (or absence) relevant to the purpose. This will include tables and graphs if appropriate.
- A **conclusion** analysing your processed data in terms of the purpose of your investigation.
- A **discussion** of the biological concept or process in relation to the results of your investigation.
- An **evaluation** of your investigation. This involves a justification of the conclusion in terms of the method that you used by considering the reliability of the data or the validity of the method (i.e. how sources of error, limitations or bias were minimised or overcome).



## SUGGESTED READING

### Kea and Kaka

- *Kea, Bird of Paradox: The Evolution and Behaviour of a New Zealand Parrot*. 1999. J. Diamond and A. Bond. (pp. 126-132)  
*This extract discusses a study of kea play behaviour and covers the methods, procedures and types of kea play.*
- 'Social Play in Kaka (*Nestor meridionalis*) with Comparisons to Kea (*Nestor notabilis*)'. *Behaviour*. 2004. J. Diamond and A. Bond. (pp. 183-186)  
*A results table comparing percentages of play bouts and play actions in both kea and kaka.*
- 'Social Play in Kakapo (*Strigops habrotilus*) with Comparisons to Kea (*Nestor notabilis*) and Kaka (*Nestor meridionalis*)'. *Behaviour*. 2006. J. Diamond, D. Eason, C. Reid and A. Bond. (pp. 187-190)  
*A table with a comparative ethogram that describes and compares play behaviour in kea, kaka and kakapo.*

NOTE: See *Animals in Science* DVD for examples of play behaviour in dogs and kea.

NOTE: Page numbers refer to *Animals in Science*

### Dogs

- 'Mammalian Play: Training for the Unexpected'. *The Quarterly Review of Biology*. June 2001. M. Spinka, C. Newberry and M. Bekoff. (pp. 191-193)  
*This article extract looks at the adaptive value of play, explains 'self-handicapping' and discusses the 'excitement' of play for the animals involved.*
- 'Play Signals as Punctuation: The Structure of Social Play in Canids'. *Behaviour*. 1995. M. Bekoff. (pp. 172-178)  
*This article extract looks at and explains what play signals are and how to interpret them. It also discusses the structure of play sequences and the methods ethologist Marc Bekoff used to study play in canids.*
- 'Social Play and Play-soliciting by Infant Canids'. *American Zoologist*. 1974. M. Bekoff. (pp. 179-182)  
*This extract gives definitions of specific canine play actions with photographic illustrations.*



## EXTENSION EXERCISE

This extension exercise enables you to look further into the *moral* significance of play behaviour. In this exercise you will question whether fairness, trust, honesty, forgiveness, empathy and virtue play a part in play behaviour.

Today's leading ethologists (those who study the science of animal behaviour) are turning their attention to the emotional lives of animals – how they live and how they play. Most of us have witnessed, or even participated with, animals at play at some time or other. In the following passage Marc Bekoff explains how studying animal play helps us understand animal morality:

*“... when animals play there are rules of engagement that must be followed, and when these break down, play suffers. Animal play appears to rely on the universal human value of the Golden Rule – do unto others as you would have them do unto you. Following this requires empathy (feeling another's feelings) and implies reciprocity (getting paid back for favors assuming that others follow the same rule). Further, in the social arena, animals who don't play well don't seem to do as well as those who do play. Darwin might very well have been right when he speculated that more sympathetic individuals have more reproductive success – they survive better.”*

Bekoff, Marc. *The Emotional Lives of Animals: A Leading Scientist Explores Animal Joy, Sorrow, and Empathy – and Why They Matter*. 2007. p. 87 (p. 103 of *Animals In Science*).

Jonathan Balcombe explains that: *“Play is a good indicator of well-being. It occurs when other needs, such as food, shelter and safety, are sufficiently met, and when unpleasant feelings like fear, anxiety and pain are minimal or absent. Otherwise the animal's efforts would be directed at meeting these needs or relieving these feelings, at the expense of play.”*

Balcombe, Jonathan. *Pleasurable Kingdom: Animals and the Nature of Feeling Good*. 2006. p. 68.

## TASK 1

Choose one of the following moral questions and consider how it relates to your findings. Write **200 words** on the question of whether or not moral behaviour was evident in your investigation into animal play behaviour.

### MORAL QUESTIONS (these need to tie in with the investigative questions)

#### Fairness, trust, honesty and cooperation

- How do animals react to unfair play?
- How do animals negotiate agreements to play (as opposed to mating or fighting)?
- How do animals display honesty and trust during play? Was trust ever violated, and if so were there any penalties or 'costs' for being dishonest?
- In what ways does play teach animals the agreed notions of right and wrong behaviour?
- Did your investigation reveal any evidence that the animals under observation were working to a set of 'rules' apparent to all involved?

#### Rough play

- Were individuals who played too roughly or aggressively avoided? For instance, did individuals that showed high rates of aggressive behaviour have trouble engaging others in play, did they have shorter bout lengths or were they involved in fewer play interactions?

#### Apology and forgiveness

- In what ways do animals experience and communicate 'good' and 'bad' behaviour when playing together?
- Were there any behaviours that indicated what could constitute an 'apology'?

#### Vulnerability and concern for others (self-handicapping, role-reversing)

- How did animals manage differences in size, age and dominance during play? Did this lead to self-handicapping (inhibiting one's strength, dominance, etc) such as role-reversing?

### Read the following texts to help with your conclusions:

- 'Wild justice and fair play: cooperation, forgiveness and morality in animals'. *Biology and Philosophy* 19. 2004. M. Bekoff. p. 227  
*This article extract discusses the evolution of social morality and how it relates to non-human animals using social play as an example of how cooperation and fair behaviour are negotiated.*
- *The Emotional Lives of Animals: A Leading Scientist Explores Animal Joy, Sorrow, and Empathy – and Why They Matter*. 2007. M. Bekoff. p.103  
*This book extract defines fairness during play and discusses the idea of morality in animals. It also looks at the emotional response to play and explains the role of the play bow, role-reversing and self-handicapping.*

NOTE: Page numbers refer to *Animals in Science*