



Adrienne Anderson <aand@waikato.ac.nz>

Protocol 916- An investigation of sub-optimal choice by possums

Stephanie Hill <sah58@students.waikato.ac.nz>

14 May 2014 07:46

To: Adrienne Anderson <aand@waikato.ac.nz>

Hi Adrienne

I would like approval to make a small change to Protocol 916: An investigation of sub-optimal choice by possums.

I would like to change the stimuli that signal different reinforce probabilities from coloured lights to an array of small lights that will be presented in different configurations (e.g. as a vertical or horizontal lines. These arrays of lights are stimuli that we know possums can discriminate between and associate with different outcomes.

Thanks

 Stephanie Hill

Approved



Signed

18/07/14
Date

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Protocol Number: **916**

APPLICATION COVER SHEET

Project Details (Do not use acronyms)	
Full Protocol Title: An investigation of sub-optimal choice by Possums.	
Name of Primary Applicant: Stephanie Hill	
Faculty/School/Department: School of Psychology	
Expected start date: 22 April 2014	Expected completion date: 22 July 2016
Animals species: Possums (common name)	Number to be used over entire project: 6
Impact Level: Little impact (E.g. No impact, Little impact, Moderate impact. See Q 6 Animal Use Statistics Form – Appendix 1):	

Type of Application (Can tick more than one box):	<input checked="" type="checkbox"/> Research <input type="checkbox"/> Teaching <input type="checkbox"/> Other (Specify)	<input checked="" type="checkbox"/> Part of research thesis (Part-time thesis)
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Standard Operating Procedures:	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes: SOP Number/ Title: Was the application approved <input type="checkbox"/> No <input type="checkbox"/> Yes
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Other AEC approval:	Has this application been submitted any other AEC for approval <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Specify Committee) Details:
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Funding support:	Is this research part of a funding grant either received or pending <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (Specify funding source) Details:
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OFFICE USE ONLY		Protocol Number: 916
This proposal is approved for the period: (2014)		
From: 8 May 2014	To: 22 July 2016	
Signature AEC Chair: <i>[Signature]</i>	Date: 8/05/14	

All research involving the use of animals must comply with the *Animal Welfare Act (1999)* and the University of Waikato Code of Ethical Conduct for the Use of Animals in Teaching and Research.

Please submit this form to the Animal Ethics Committee, Research Office, B Block, University of Waikato or email animal.ethics@waikato.ac.nz

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APPLICATION

Section 1: Personnel Information

1.1 PRIMARY APPLICANT (Researcher or student undertaking thesis)	
Title, first name, last name: Stephanie Hill	
Qualifications: BSocSci (Psychology and Sociology), PGDip (Psychology)	
Institutional mailing address: Private Bag 3105, Hamilton 3240	
Email: sah58@students.waikato.ac.nz	Phone: 0272101142
Please detail the relevant experience you have (including the number of years) in the procedures/techniques to be used in this project.	
Previous experience working with hens in PSYC314 in 2012. Training from other Masters/PhD students with the Possums.	

1.2 CHIEF SUPERVISOR (WHEN APPLICABLE) TO BE COMPLETED BY THE STUDENT'S SUPERVISOR (IT IS EXPECTED THAT THE SUPERVISOR WILL ASSIST THE STUDENT WITH THE DEVELOPMENT OF THIS APPLICATION)	
Title, first name, last name: Dr Lewis Bizo	
Qualifications: BSc, PGDipSci, PhD(Otago)	
Mailing address: School of Psychology, University of Waikato, Private Bag 3105, Hamilton 3240	
Email: lbizo@waikato.ac.nz	Phone: +64 7 838 4466 extn. 6401
What is your Role in this project?	
Supervisor – I will assist the student in planning her research project, data analysis, and in the preparation of her thesis. I will also monitor the student progress and the health of animals, and state of her experiment during weekly meetings. I will not be assisting with the day-to-day handling of animals or data collection.	
Please detail the relevant experience you have (including the number of years) in the procedures/techniques to be used in this project.	
Associate Professor Bizo has over 23 years' experience conducting research with non-human animals, rats, pigeons, hens, and possums specifically. In the past 3 years he has supervised 3 Masters research projects that have used the peak procedure specifically to investigate the timing perception abilities of both hens and possums.	

1.3 OTHER PERSONNEL CONTACT DETAILS MUST ALWAYS BE PROVIDED (Indicate which personnel are handling and which are watching)			
Title, First Name, Last Name	Qualification	Contact details	Role in Project
Ali Cullum	BSc (hons), BVM&S, MACVSc (Avian Health)	027 288 3068	Veterinarian to the Project
Jenny Chandler	BSc, MAScTA	07 838 5568	Animal technician
PhD and Masters students	Completing PhDs and Masters thesis	07 838 5568	Running the experiment/ animal husbandry (feeding and weighing the possums).

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Section 2: Project Description

2.1 LAY SUMMARY OF OVERALL PROJECT (one paragraph)

(To be written in terms that people with a non-scientific background will understand)

It is assumed that animals will make choices that optimise the amount of food they receive as this aligns with a biological model/survival of the fittest. However, it has been found that under some circumstances animals will make sub-optimal choices.

Previous studies have shown that both hens and pigeons show preference for a choice that does not optimise their total amount of reinforcement. Hens and pigeons choose an alternative that provides low probability of reinforcement over an alternative that provides a higher but less predictable rate of reinforcement.

It would appear that animals are risk averse and are willing to 'lose' food in preference for certainty. Previous research has only used avian species and some with humans and dogs. The aim here is to extend this research to Possums (a Marsupial).

2.2 AIM OF THE PROJECT

(Brief and written in terms that people with a non-scientific background will understand)

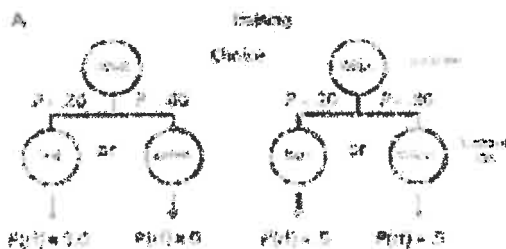
The aim of this research project is to further understand suboptimal choice in possums and to determine if the results of previous studies on Hens and Pigeons will generalise to possums. That is to determine if animals will choose the option that signals low probability reinforcement or no reinforcement over the option that is reinforced 50% of the time.

After the initial replication the aim will be to vary variables that are known to affect choice food choice, to determine that effect these variables have on suboptimal choice. These are to vary the probabilities, predictability, delays, and size and quality of reinforcement.

2.3. BACKGROUND

(Include a short review of previous relevant studies in this area and references where appropriate)

Ngatai (2014) replicated part A and B of Stagner and Zentall's (2010) experiment with hens and found that hens had the same preference for the low probability alternative. The following figure shows Stagner and Zentall's (2010) initial phase. This figure shows the two choice alternatives. Pigeons were trained to peck an initial key and then make a choice of a left or right key; these had two different probabilities of getting reinforcement. On the left key the two probabilities were a 20% chance of getting red discriminative stimuli that signalled reinforcement 100% of the time or a green discriminative stimuli that signalled non-reinforcement.



On the right key the pigeons had a 20% chance of receiving a blue discriminative stimuli or an 80% chance of getting a yellow discriminative stimuli that signalled reinforcement on 50% of the trials.

The results from this experiment showed that pigeons quickly showed a preference for the low probability but certain reinforcement.

Pattison, Laude and Zentall (2013) studied the effects of enrichment on choice. Their probabilities were slightly different but they found that pigeons that had access to enriched environments (had access to group flight cages 4 hours a day) were more likely to optimise food while the control pigeons made suboptimal choices.

The original study has also been expanded to humans and Dogs. Molet, Miller, Laude, Kirk, Manning and Zentall (2012) conducted a study on humans where they used access to different video games with the same probabilities as the pigeons. They found that individuals who identified as being gamblers were more likely to show suboptimal choices over those who identified as non-gamblers.

Pattison and Zentall (2014) looked into suboptimal choice in Dogs, more specifically the less is more

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effect, their study consisted of giving dogs two choices of food (cheese and carrot). They found that dogs preferred a slice of cheese over a piece of carrot and additionally preferred a single slice of cheese over a slice of cheese and a piece of carrot. This research also shows that dogs make suboptimal choices.

This research shows that animals are likely to make choices that do not optimise food. Thus it is expected that Possums will make the same suboptimal choices.

2.4 JUSTIFICATION FOR THE PROJECT

a. What are the potential benefits of the research – to humans, other animals, or the environment? To test whether the results of previous experiments by Stagner and Zentall (2010) and Ngatai (2014) will generalise to the possum population and to establish if this choice alters when variables are changed. The benefits of conducting this experiment on possums are to see if marsupials make the same choices as hens and pigeons.

b. How will the results of this work be disseminated?
Master's thesis and presentations at conferences or publication if applicable.

2.5 DESCRIPTION OF PROCEDURES

(Detailed description of all procedures)

What will happen to the live animals? Give a step-by-step description of all procedures to be carried out on each group of animals. The use of your own flowchart, table or "research design" figure is recommended for complex experiments.

The possums will be individually housed in open wire cages, with a nesting box attached to the top. These cages are located in a room at no. 3 Dairy (310 Ruakura Rd). This room is on a reverse 12 hour day/night cycle, where possums are in darkness during the day and are exposed to light during night time. Possums will be fed with pellets, apples, carrots and leafy greens such as Dock. They will be weighed weekly and their food adjusted (increased or decreased) to maintain a stable weight.

The initial session will comprise of establishing whether the results from Ngatai (2014) and Stagner and Zentall (2010) are replicated with possums this will be done by exposing the possums to two choice alternatives.

Initially possums will have to push a central lever, followed by making a choice of the right or left lever.

The right lever will signal a discriminative stimulus with a 20% probability of being reinforced 100% of the time or a non-discriminative stimulus with an 80% chance of no reinforcement. The choice on the left lever will signal one of two discriminative stimuli with a 50% chance of reinforcement.

Choice on reinforcing contingencies will allow possum's access to food. This is illustrated in the figure above.

Once the initial replication is complete the following conditions will be manipulate variables that are shown to affect food choice. These are: probability (varied between 50-100%), predictability (varied between 80-20% and 50-50%), delay across a range (0-60%), size (28s. access to magazine), and finally the quality of food. Quality of food will be altered by changing the food types such as, coca puff and barley mix, rolled oats, and bran flakes; these are all food types that have been used in previous preference experiments (e.g. Cronin, 2010).

2.6 DATA COLLECTED AND PROPOSED STATISTICAL ANALYSIS

(Give a clear description of the design of the experiment. Describe the statistical approach that will be used and evidence that the approach can yield answers to the proposed research question.)

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3.2.2	Describe container (dimensions of cages / pens)	540mm wide x 1050mm high x 470mm deep wire cage with a wire shelf 700mm above the floor of the cage
3.2.3	How many animals per container / enclosure?	1 animal per cage
3.2.4	What will be the duration of housing?	Indefinite
3.2.5	Who will be responsible for the care of the animals?	Jenny Chandler

3.3 PRIOR HISTORY OF THE ANIMALS

(If animals are to be used from another project a summary of the type of project, its protocol number, and other information such as the amount of time between projects etc. is to be stated)

Hasty (est 9 years)
678 - MTS study 2008,
787 & 881 (Kristie's masters & Doctorate)

Boo Boo (7)
891 (Ayla's)

Caper (9), Peppi (8)
666 - sound expt,
785/810 - timing stuff Rachael,
820 - Ian Cronin food pref,
852 - Chris - timing
891 - Ayla - food pref

Monkey (4)
852 - Chris - timing
891 - Ayla - food pref

Charlotte (11)
678 - MTS
786 - Kristie's free feed for a year
852 - Chris - timing
891 - Ayla - food pre

3.4 MANAGEMENT OF ADVERSE EVENTS

(Describe any possible adverse events and how you might manage these. For example, proposed methods of prevention or control such as regular inspection, analgesic regimes and specified humane end points)

No adverse events are expected during the experiment. Possums will be monitored by PhD and masters students as well as Jenny. If anything adverse happens to the possums then the animal technician will be informed and the vet called.

3.5 FATE OF THE ANIMALS

(What will happen to the animals at the end of the experiment?)

The possums will remain at No. 3 dairy for future experimental use.

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Section 4: Specific Procedures

4.1 INSTITUTIONAL DRUG ADMINISTRATION ORDER (See Appendix 2)
<i>Is there an operational procedure required for the use of a product (drug /chemical) in the experiments?</i> If 'yes' this will require an Institutional Drug Administration Order.
Name of Product:

4.2. USE OF ANAESTHIC If 'Yes' complete the table below	
4.2.1	Name of anaesthetic
4.2.2	Local or general
4.2.3	Method of restraint
4.2.4	Will animals have to recover from anaesthetic? How long is the recovery period?
4.2.5	How will you deal with post-operative pain and/or discomfort?

Section 5: Declaration

5.1 PERMITS AND APPROVALS	
5.1.1	Has an application been made to another Committee e.g. Ruakura? No
5.1.2	Are any DOC permits required? No
5.1.3	Are any Iwi approvals required? No
5.1.4	Are any other approvals / permits required? No

5.2 DECLARATION		CHECK
5.2.1	I have read and understand the conditions outlined in the Code of Ethical Conduct for the Use of Animals for Teaching and Research. http://www.waikato.ac.nz/research/unilink/ethics/animal_ethics.shtml	√
5.2.2	I have read the Good Practice Guide for the Use of Animals in Research, Testing and Teaching http://www.biosecurity.govt.nz/files/regs/animal-welfare/pubs/naeac/guide-for-animals-use.pdf	√
5.2.3	If this application is approved, I will inform the Committee of any changes in the project or unexpected outcomes affecting animal welfare, and any event (beyond any approved manipulation) impacting adversely on	√

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5.2.4	I will submit a complete Animal Use Statistics Form by the specified date.	
5.2.5	I will report as required to the Animal Ethics Committee.	

Signed by the applicant:

[Signature] Date: 8/4/2014

I accept responsibility for this project's compliance with the University's Code of Ethical Conduct for the Use of Animals for Teaching and Research.

Signed by the Chief Supervisor (if applicable):

[Signature] Date: 8/4/2014

I accept responsibility for this project's compliance with the University's Code of Ethical Conduct for the Use of Animals for Teaching and Research.

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Appendix 1

Animal Use Statistics Form- one species per sheet

Note: Fill in the YELLOW areas now with the number of animals you propose using (this is part of the application form). The BLUE areas are to be filled in after the research has been completed, and a SIGNED hard copy of this form only is to be submitted to the AEC Coordinator by the completion date indicated on page 1 of this application form.

P = Planned to Use AU = Actually Used

1. Animal Type:		
Possums 1t		

2. Source of Animals:	P	AU
Breeding unit	2	
Commercial		
Farm		
Born during project		
Captured	4	
Imported into New Zealand		
Public sources		

3. Status of Animals:	P	AU
Normal/conventional	6	
SPF/germ free		
Diseased		
Transgenic/chimera		
Protected species		
Unborn/prehatched		
Other		

4. Purpose:	P	AU
Teaching		
Species conservation		
Environmental management		
Animal husbandry		
Basic biological research	6	
Medical research		
Veterinary research		
Production of biological agents		
Development of alternatives		
Other		

5. Re-use:	P	AU
No prior use		
Previously used	6	

6. Grading:	P	AU
No impact	A	
Little impact	B	6
Moderate impact	C	
High impact	D	
Very high impact	E	

(see attached grading form)

7. Alive:	P	AU
Retained [by your institution]	6	
Returned [to owner]		
Released [to the wild]		
Disposed of [eg to works or rehomed]		
Total Alive		

8. Dead:	P	AU
Killed for dissection, sampling		
Died/destroyed in the course of manipulation/use		
Euthanased after manipulation or use		
Died/destroyed for reasons not associated with manipulation/use		

Completed by:	
Signature:	
Date:	
Protocol No.	

ANIMAL TYPE CODES:

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Type of animal used. No distinctions on basis of sex, age, breed, strain or physiological condition.

BOX 1	CODE LETTERS		CODE LETTERS
Rodents	1 a	Mice	1 p
	1 b	Rats	1 q
	1 c	Guinea Pigs	1 r
	1 d	Hamsters	1 s
Rabbits	1 e	Rabbits	1 t
Farm Animals	1 f	Sheep	1 u
	1 g	Cattle	1 w
	1 h	Goats	1 x
	1 j	Deer	1 y
	1 k	Pigs	Other Species (°name)
Other Domestic	1 m	Horses	
Mammals	1 n	Dogs	
	1 o	Cats	
		Birds	
		Miscellaneous	
		Other	

Grading of Manipulation Examples

Grade A – “No impact or virtually no impact”

Examples:

Mental state: Field observations of grazing behaviour on farms, or benign handling of tame and trained animals that are familiar with all personnel and procedures and with the place where the procedures are conducted.

Food/water: Animals kept outdoors eating their usual food in appropriate amounts; grazing trials on treated pastures; offering supplements to naturally available food; provision of complete, balanced rations to meet all nutritional requirements of animals maintained indoors.

Environmental challenge: Exposure to ambient conditions that are within the thermoneutral range; reduced barometric pressures which do not cause increases in red blood cell production.

Disease/injury/functional impairment: Studies of healthy uninjured animals that are kept in physical conditions which do not themselves lead to injuries such as lameness or compression sores; studies to establish normal characteristics of healthy animals.

Behaviour: Studies of wild or undomesticated animals in their natural habitats; field studies of domesticated animals.

Grade B – “Little impact”

Manipulations of minor impact and short duration

Examples:

Mental state: Experiments on completely anaesthetised animals that do not regain consciousness; simple venipuncture or venisection; injection of non-toxic substances; skin tests which cause low-level irritation without ulceration/erosion; feeding trained animals by orogastric tube; movement of free-range domesticated animals to unfamiliar housing; minor restrictions of water and/or feed intake beyond the normal period of satiation.

Food/water: Water priming for kidney function tests; short-term overall food intake restrictions or excesses that are within usual tolerance levels for the species; short-term changes in dietary composition that cause no clinical signs of deficiency or toxicity, but which would cause such symptoms in the longer term.

Environmental challenge: Exposure to levels of cold or heat that are outside the thermoneutral range, or barometric pressures that increase red blood cell production, but which remain within the capacity of the animals to adapt and do not lead to debility in the long term.

Disease/injury/functional impairment: Studies of vaccines using killed pathogens; tuberculosis tests; induction of mild fever without other debilitating effects; induction of subclinical parasitism; healing of minor superficial incisions, cuts or wounds; minor surgical and/or pharmacological modification of homeostatic capacity (for example, creation of non-obstructive gut fistulae; splenectomy; endocrine gland removal with complete and permanent hormone replacement therapy); physical conditions which cause transient lameness of low intensity, mild compression sores or abrasions.

Behaviour: Mild and short-term physical restraint; keeping free-range domesticated animals in a yard; movement of free-range domesticated livestock to unfamiliar housing; operant conditioning with positive reinforcement in barren laboratory environments; benign preference tests in unnatural surroundings.

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Grade C – “Moderate impact”

Manipulations of minor impact and long duration or moderate impact and short duration

Examples:

Mental state: Recovery from major surgeries like thoracotomy, orthopaedic procedures, hysterectomy or gall bladder removal with effective use of analgesics; surgical procedures on conscious animals but with the use of local anaesthesia and systemic analgesic; movement of excitable free-range domesticated livestock to unfamiliar housing; short term capture, handling and restraint of wild or semi-domesticated animals that exhibit marked flight responses; moderate restrictions of water and/or feed intake beyond the normal period of satiation.

Food/water: Simulation of usual overall intake restrictions often experienced by pregnant/lactating ruminants during cold winters or drought; dietary induction of milk fever in cattle; induction of mild deficiency or toxicity signs by feeding diets containing inadequate or excessive amounts of essential nutrients.

Environmental challenge: Short-term exposure to severe extremes of cold or heat which would lead to collapse if prolonged.

Disease/injury/functional impairment: Studies of live vaccines; induction of clinical parasitism; induction of mild reversible infectious diarrhoea; moderate surgical and/or pharmacological modification to homeostatic capacity (for example, limited gut resection; endocrine gland removal with delayed or incomplete hormone replacement therapy); physical conditions that cause minor chronic lameness or other injuries; studies of the effects of infectious or toxic agents that cause rapid death without distress.

Behaviour: Medium-term restrictions of instinctive behaviour; medium-term holding of ruminants in a metabolism crate; long-term restraint leading to the development of reversible stereotypies; changing social group composition.

Grade D – “High Impact”

Manipulations of moderate impact and long duration or high impact and short duration

Examples:

Mental state: Recovery from major surgery under anaesthesia without the use of postoperative analgesics; marked social or environmental deprivation; longer term capture, handling, restraint or housing, without the use of tranquilisers, of wild or semi-domesticated animals that exhibit marked flight responses.

Food/water: Dietary induction of advanced pregnancy toxemia in sheep or ketosis in dairy cattle; dietary induction of advanced signs of nutrient deficiency or excess; severe deleterious effects of dietary toxins; severe restrictions of water and/or feed intake beyond the normal period of satiation.

Environmental challenge: Prolonged exposure to severe cold or heat that would lead to failure of thermoregulation and collapse, but the exposure is terminated just before those outcomes.

Disease/injury/functional impairment: Studies of severe facial eczema; induction of severe diarrhoea or severe infectious pneumonia; protracted or irreversible pharmacological modification of homeostatic capacity (for example, chemical induction of diabetes mellitus without replacement therapy); marked surgical modification of homeostatic capacity (for example, extensive gut resection; cutting of sensory or motor nerves serving large areas of the body from which no self-mutilation injury results; precise lesioning of limited areas of the brain but with intervention before collapse); physical conditions that cause moderate chronic lameness or other injuries; studies of the effects of infectious and toxic agents that cause either a protracted death with minor distress or a rapid death with moderate distress.

Behaviour: Application of marked and repeated noxious stimuli from which escape is impossible; prolonged periods (several hours or more) of close physical restraint; marked alterations to the perceptual or motor functions of animals to test consequent behaviour.

Grade E – “Very high impact”

Manipulations of high impact and long duration

Examples:

Mental state: Conducting major surgeries without the use of anaesthesia on control animals in assessing efficacy of analgesics; testing the efficacy of analgesics in animals with severe induced pain.

Food/water: Experiments that cause animals to die from poisoning by toxins in the diet; protracted and severe restrictions on water and/or feed intake.

Environmental challenge: Purposeful exposure of conscious animals to lethal extremes of cold, heat or barometric pressure which duplicate naturally occurring conditions.

Disease/injury/functional impairment: Studies of methods for killing pest animals; cutting of sensory or motor nerves serving large areas of the body from which self-mutilation injury results; evaluation of vaccines where death is the measure of failure to protect; studies of the effects of infectious or toxic agents which cause either a protracted death with marked distress or a rapid death with severe distress.

Behaviour: Application of marked and repeated extremely noxious stimuli from which escape is impossible; prolonged periods (several hours or more) of close physical restraint.

