NC3Rs

National Centre for the Replacement, Refinement and Reduction of Animals in Research

www.nc3rs.org.uk

Training laboratory-housed non-human primates: A survey of current practice in the UK

Mark J Prescott & Hannah M Buchanan-Smith

National Centre for the Replacement, Refinement and Reduction of Animals in Research

Plan of presentation

- Training as a refinement
- JAAWS special issue
- The UK survey
- Resources for developing and implementing training programmes
- Future activities on training

Guidelines recommending training

- Home Office Codes of Practice (1989, 1995)
- IPS Guidelines (1989)
- Biological Council (1992)
- CCAC Guide (1993)
- Berlin Workshop (1994)
- NRC ILAR Guide (1996)
- NHMRC AWC Policy (1997)
- UFAW Handbook (1999)
- USDA APHIS ‘Psychological Well-being’ (1999)
- SCAHAW ‘Primate Welfare’ (2003)
- MRC (2004)
- LASA/MRC (2004)

Training is a means of…

Reducing adverse effects (Refinement)

↓

Reducing data variability

(Improving quality of science)

↓

Reducing the number of animals required (Reduction)

Restraint can change normative…

Reinhardt 2003

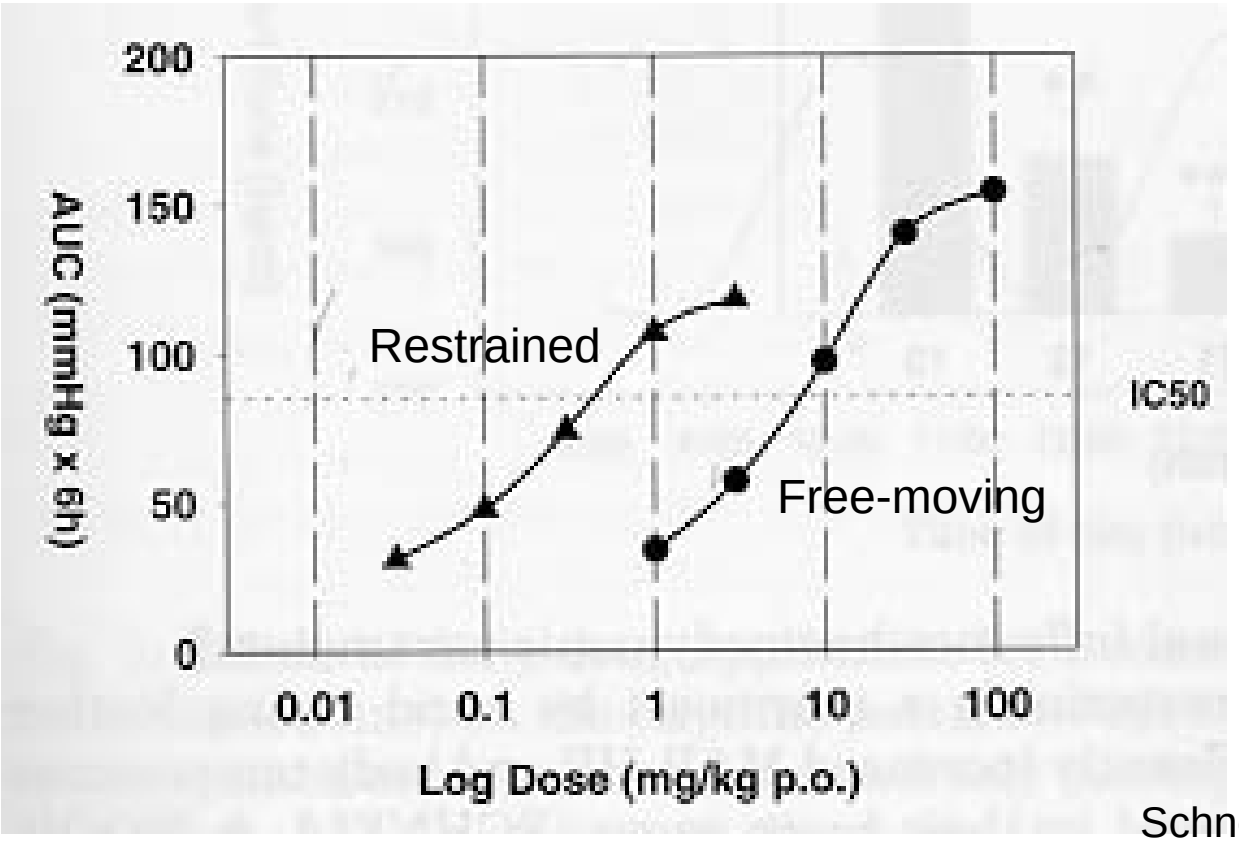
- blood pressure, heart rate, respiration rate
- secretion of cortisol, testosterone, progesterone, adrenal androgen, prolactin, growth hormones, FSH, glucagon
- glucose regulation
- white blood cell count
- blood concentration
- aminotransferase activity
- acid-base balance

Offering a limb for venepuncture

Reinhardt 2003

- Two fold increase in serum cortisol with manual restraint method
- No increase in serum cortisol with trained method
- Mean time investment = 38 mins. per animal (16-69 mins.)
- Trained method is safe and requires 1 person as opposed to 2 with the manual restraint method

Effect of restraint stress on drug activity



BP lowering activity of an Angiotensin-II antagonist (based on the IC_{50}) was found to be more than 10X higher when tested in restrained marmosets

Schnell & Gerber 1997

Training can also…

enhance animal care and well-being by…

- reducing the need separate animals from their social groups
- reducing abnormal behaviour
- increasing activity
- providing greater choice and control over daily events
- reducing aggression/improving socialisation
- facilitating health inspection and treatment
- improving the human-animal relationship

Benefits to staff

- Improve the ease, speed and safety with which work can be performed
- Reduce the number of staff required for a given procedure

McKinley et al. 2003

- Weighing trained marmosets is 20X faster than untrained and 100% reliable
- Time spent training is recouped within 8-20 sessions

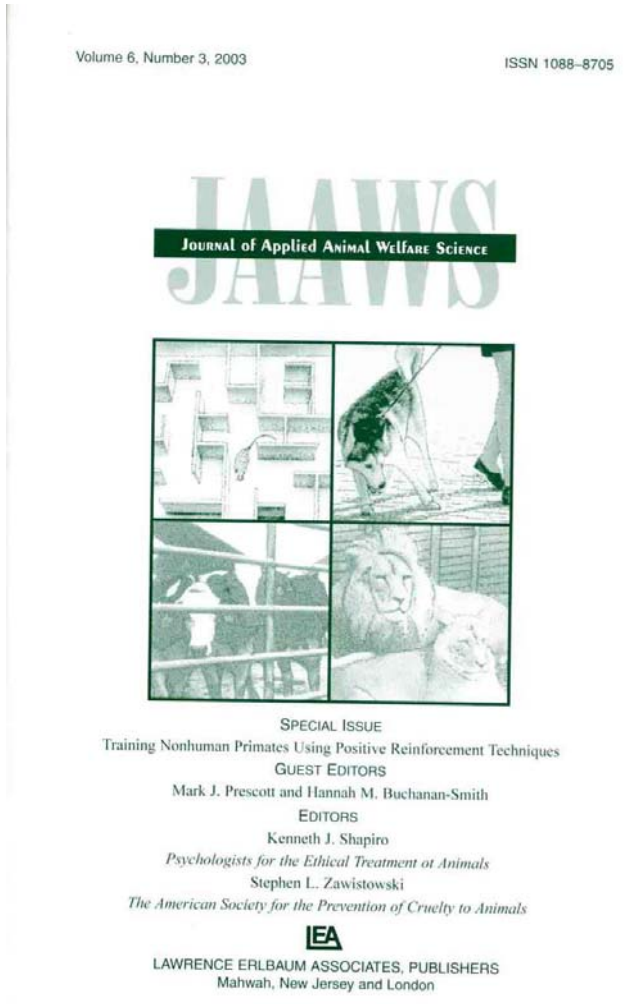
NC3Rs

National Centre for the Replacement, Refinement and Reduction of Animals in Research

JAAWS special issue

- IPS Symposium 2002
- Eight papers from UK and USA covering training in a variety of species for a variety of purposes
  - Provide details on how training was achieved
  - Quantify time investment and effectiveness
- Available from NC3Rs

Prescott & Buchanan-Smith 2003


Volume 6, Number 3, 2003

ISSN 1088-8705

JAAWS

Journal of Applied Animal Welfare Science

SPECIAL ISSUE

Training Nonhuman Primates Using Positive Reinforcement Techniques

GUEST EDITORS

Mark J. Prescott and Hannah M. Buchanan-Smith

EDITORS

Kenneth J. Shapiro

Psychologists for the Ethical Treatment of Animals

Stephen L. Zawistowski

The American Society for the Prevention of Cruelty to Animals

LEA

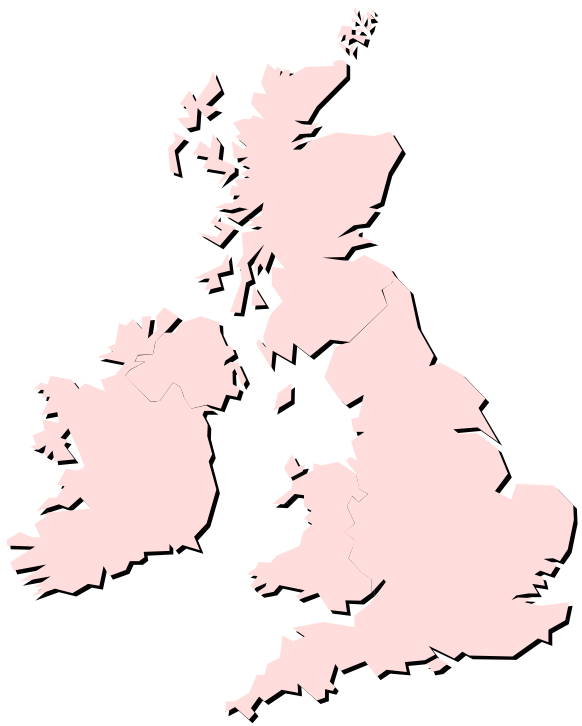
LAWRENCE ERLBAUM ASSOCIATES, PUBLISHERS

Mahwah, New Jersey and London

Objectives of UK survey

- Create a database of current knowledge and practice of training, socialisation, habituation and desensitisation
- Identify good practice
- Identify obstacles and solutions to further uptake of these processes

➡ Facilitate refinement of the use and breeding of laboratory-housed primates



Prescott & Buchanan-Smith submitted

Methods

- Face to face discussion based on a mixed-mode questionnaire
- Interviewee(s) had primary responsibility for coordinating and conducting training, or else for primate welfare
- Data presented here are for 32 individuals from 15 establishments (> half of UK laboratories housing primates)
- Training = shaping of a behaviour so that a primate actively responds in a way which is desired by the trainer

Use of training

Charcteristic	University	Fundamental, Government and Pharmaceutical	Contract research	Breeding
Use of training	6/6	1/3	3/3	0/3
Formal prog.	6/6	0/3	0/3	0/3
Av. no. animals held	<10	250	350	600
Av. no. animals used	2	25	490	10
Av. no. animals bred	1	35	N/A	220
Av. staff ratio	1:1	1:45	1:20	1:70
Age at first use (months)	3 - 24	3 - 24	12 - 36	18 - 24
Duration of use	3 mths – 10 yrs	3 mths – 7 yrs	1 wk – 1 yr	1 wk – 2 yrs (exp) 15 – 20 yrs (breeding)
Av. group size	1 - 5	1 - 30	1 - 30	1 - 100

Training as a refinement

- All establishments believe training can be a refinement
- 11/15 have acknowledged this for over 10 years; 8/15 for over 15-25 years
- 13/15 agree that training is a feasible concept for them
- Of the 13/15 that agree training is feasible, 3 do not train
  ➡ scope for refinement
- All of the establishments who do not train identified instances where training would benefit animals and staff
  ➡ scope for refinement

Constraints on training

Constraint	Do train	Do not train, have tried	Do not train, have not tried	Total
Paucity of information on how to train	3	1	2	6
Lack of staff	1	1	3	5
Perceived time investment	2	.	1	3
Lack of time before studies begin	2		1	3
Lack of assessment of benefits	.	1	2	3
Lack of confidence in ability to train	2	.	1	3
Possible effects on animal health	1	.	.	1
Concern about staff health and safety	.	.	1	1
Concern about scientific validity	.	.	.	.

Resource requirements

Resource	Total
Audio-visual materials on how to train effectively	6
Written guidance on how to train effectively	6
In person demonstration of training practice	6
More staff	6
More time before studies begin	5
Access to a training or primate behaviour specialist	5
Wider access to reference material	5
Dedicated staff training course with practical component	5
More money	3
Face to face discussion with experts	2
Secure database on training	1

National Centre for the Replacement, Refinement and Reduction of Animals in Research

Scientific procedures and data

Stand for injection

Touch screen

National Centre for the Replacement, Refinement and Reduction of Animals in Research

Purposes (procedures and data)

Purpose	Macaques		Marmosets	
	Already train	Would like to train	Already train	Would like to train
Venepuncture	2	2	.	1
Injection	.	6	.	.
Urine sampling	.	1	1	2
Saliva sampling	.	.	.	.
Faecal sampling	.	1	.	.
Topical application	1	2	1	.
Restraint	6 (chair)	1	.	3
Oral administration	2	.	.	2
Touch screen	2	.	1	.
Lever press	1	.	1	.
Joystick	1	.	.	.
Eye tracking	1	.	.	.
Finger press	1	.	.	.

Offering a limb for venepuncture

Reference	Species	Notes
Walker et al. 1982	Rhesus	Protocol, adult females, group-housed
Vertein & Reinhardt 1989	Rhesus	Protocol, adult females
Reinhardt et al. 1990	Rhesus	Reduced cortisol for trained animals
Reinhardt 1991	Rhesus	Protocol, adult males, pair- and group-housed
Reinhardt 1992	Rhesus	Protocol, young females, pair-housed
Phillipi-Falkenstein & Clarke 1992	Rhesus	Protocol, adult females and male
Reinhardt 2003	Rhesus	Protocol, reduced cortisol for trained animals
Grant & Doudet 2003	Rhesus	Adult males, pair-housed, vascular access ports
Reinhardt & Cowley 1992	Stump-tailed	Protocol, adult males and females
Bunyak et al. 1982	Stump-tailed	Protocol, adult male
Wall et al. 1985	Vervet	
Priest 1990	Drill	Protocol, adult male
Laule et al. 1996	Chimpanzee	Protocol, young female
Moore & Suedmeyer 1997	Orang-utan	
Dettmer et al. 1996	Brown capuchin	Protocol, adult females

Husbandry and health

Transport container

Palpation

Purposes (husbandry and health)

Purpose	Macaques		Marmosets	
	Already train	Would like to train	Already train	Would like to train
Weighing	9	1	1	2
Shifting location	9	.	1	1
Collar cleaning	.	.	.	1
Capture	9	1	.	2
Separation	3	.	.	1
Station	.	2	.	3
Cooperative feeding	.	1	.	1
Palpation	.	1	.	2
Stethoscope	.	.	.	2
Joint manipulation	1 (hand)	.	.	2
Infant care	.	.	.	2
Mouth inspection/teetl	.	1	.	3
Temperature	.	1	.	2
Ultrasound	.	.	.	2
X-ray	.	.	.	.

Techniques used

Technique used	Total
Positive and negative reinforcement	9
Food or water restriction	4
Negative reinforcement only	3
Positive reinforcement only	2
Negative punishment	2
Positive punishment	1

Costs and benefits

	Costs	Benefits
To primates	Hunger or thirst when food or water restriction is used (1)	Less stress for the animals (11)
	Distress when negative reinforcement is used (1)	Enrichment through greater mental stimulation and control (4)
		More satisfactory human-animal interaction (animal well-being) (3)
To staff	Time investment (3)	Reduced opportunity for injury during procedure (1)
	Emotional upset when familiar animals are euthanased (1)	Less stress for staff (4)
	Money for staff training courses (1)	Increased staff morale (3)
		Improved efficiency of procedure (3)
		Reduced concern over health and safety of staff (3)
To science	Time investment (1)	Better quality data (7)
		Able to use animals for longer (2)
		More data per animal (2)
		Reduction in number of animals used (1)

Conclusion and recommendations

- There is considerable scope for refinement of common scientific, veterinary and husbandry procedures through use of PRT
- See handout for recommendations from the survey

Prescott & Buchanan-Smith submitted

NC3Rs

National Centre for the Replacement, Refinement and Reduction of Animals in Research

Resources for training programmes

- Tabulated literature review of primate training – over 100 articles
- Guidance on developing and implementing a training programme, including sources of advice
- Sample training protocol for training primates to enter a transport container *on request*

Prescott, Bowell & Buchanan-Smith submitted

Future activities on training

- Institute of Animal Technology (IAT) course on training primates (Scotland, October 2005) www.iat.org.uk
- NC3Rs Primate Welfare Meeting (London, November 2005) enquiries@nc3rs.org.uk and www.nc3rs.org.uk
- UFAW PHHSC funded research studentship (Verity Bowell) vab1@stir.ac.uk
- NC3Rs audio-visual aids on interpreting primate behaviour and training for co-operation with common procedures (2006)
- NC3Rs guidelines for refining food and fluid management in macaques (2006)

NC3Rs

National Centre for the Replacement, Refinement and Reduction of Animals in Research

Acknowledgements

- All establishments and individuals that participated in the UK survey
- Members of the UFAW PHHSC
- RSPCA
- European Commission
- Anita Rennie
- Providers of images