The Animal Welfare
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Zoo visitor-penguin interactions: effects on both penguins and visitors.

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ANIMAL WELFARE SCIENCE CENTRE

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Background

- Growing importance of understanding zoo human-animal relationships
  - Conservation: cannot be achieved without support of visitors
    - Encourage connection between humans and zoo animals
      - Empathy
      - Conservation awareness
  - Evidence visitors can influence zoo animal behaviour and welfare (negative, positive, neutral effects)

Aims of PhD

- To understand the manner in which visitor-animal interactions affect zoo animals and visitors
  - Determine the effects of manipulating zoo visitor-animal interactions at display exhibits

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Animal behaviour & welfare assessment

Visitor behaviour & Attitude-Questionnaire

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Little penguins – Why?

- Eco-tourism studies - human disturbances can have negative consequences for wild penguins:

- Reduced reproductive success (Ellenberg *et al.* 2006)
- Increased vigilance and agonistic behaviour (Holmes 2006, 2007)
- Lower breeding success and fledging weights (Ellenberg *et al.* 2007; McClung *et al.* 2004)

Little penguins – Why?

Behaviour	No visitor contact	Exposed to visitors
Distance from viewing area (m)	3.5	4.8*
Aggression (bouts/day)	3.4	8.8*
Pool use	0.52	0.23*
Vigilance	0.26	0.64*
Huddling	0.35	0.56*
Positioned behind enclosure feature	0.16	0.39*

Sherwen *et al.* (2015)

…..But <u>what is it</u> about <u>visitors</u> or <u>visitor conditions</u> that affect the little penguins at Melbourne Zoo?

Visitor proximity?

Noise?

???

Visitor Behaviour?

Study 1: Little penguins at Melbourne Zoo

Aim

- To determine the effects of manipulating viewing proximity and the intensity of visitor behaviour on the behaviour and stress physiology of little penguins at Melbourne Zoo.

Methodology: Design & Treatments

- 15 penguins (5 males, 10 females)
- Completely randomized 2×2 factorial design (2 factors at 2 levels) + closed enclosure
  - Treatments imposed for 2-day periods, 3 replicates

FACTORS		**Intensity of behaviour**	
		Unregulated	Regulated
Viewing Proximity	Normal viewing	**Standard zoo conditions (Treatment 1)**	**Signs (Treatment 3)**
	Reduced viewing	**Barrier (Treatment 2)**	**Barrier + Signs (Treatment 4)**


Research in Progress.
Please be as quiet as possible,
move slowly and do not attempt
to interact with the animals.
Thank you.

Methodology: Animal Observations

- **Indirect observations: CCTV cameras**
  - 3x1h videos per day (10:00-11:00, 11:30-12:30, 14:00-15:00h)
  - Sampling
    - Instantaneous point sampling at 3-min intervals (state behaviours e.g. huddling, resting, idle, vigilant, swimming, diving)
    - One-zero sampling over 30-sec intervals (event behaviours e.g. preening, agonistic interactions)

(a).

(b).

(c).

(d).

Methodology: Visitor Observations

- **Direct observations (7 x 30min blocks per day)**
  - Sampling
    - Instantaneous point sampling at 3-min intervals – visitor number
    - Continuous sampling
      - Ambient noise, visitor behaviour
  - Questionnaire: assess visitor attitudes
    - the welfare of little penguins
    - the quality of their exhibit
    - exhibit manipulations
    - visitor experience

Results: Visitor behaviour

Behaviour	Proximity		Viewing proximity
	Normal viewing	Reduced viewing	
Banging	32	1.7	**0.00076**
Looming	476	1.2	**<0.001**
Tactile contact with water (TCW)	19	0	**<0.001**
Sudden movement (SM)	25	2.4	**0.019**

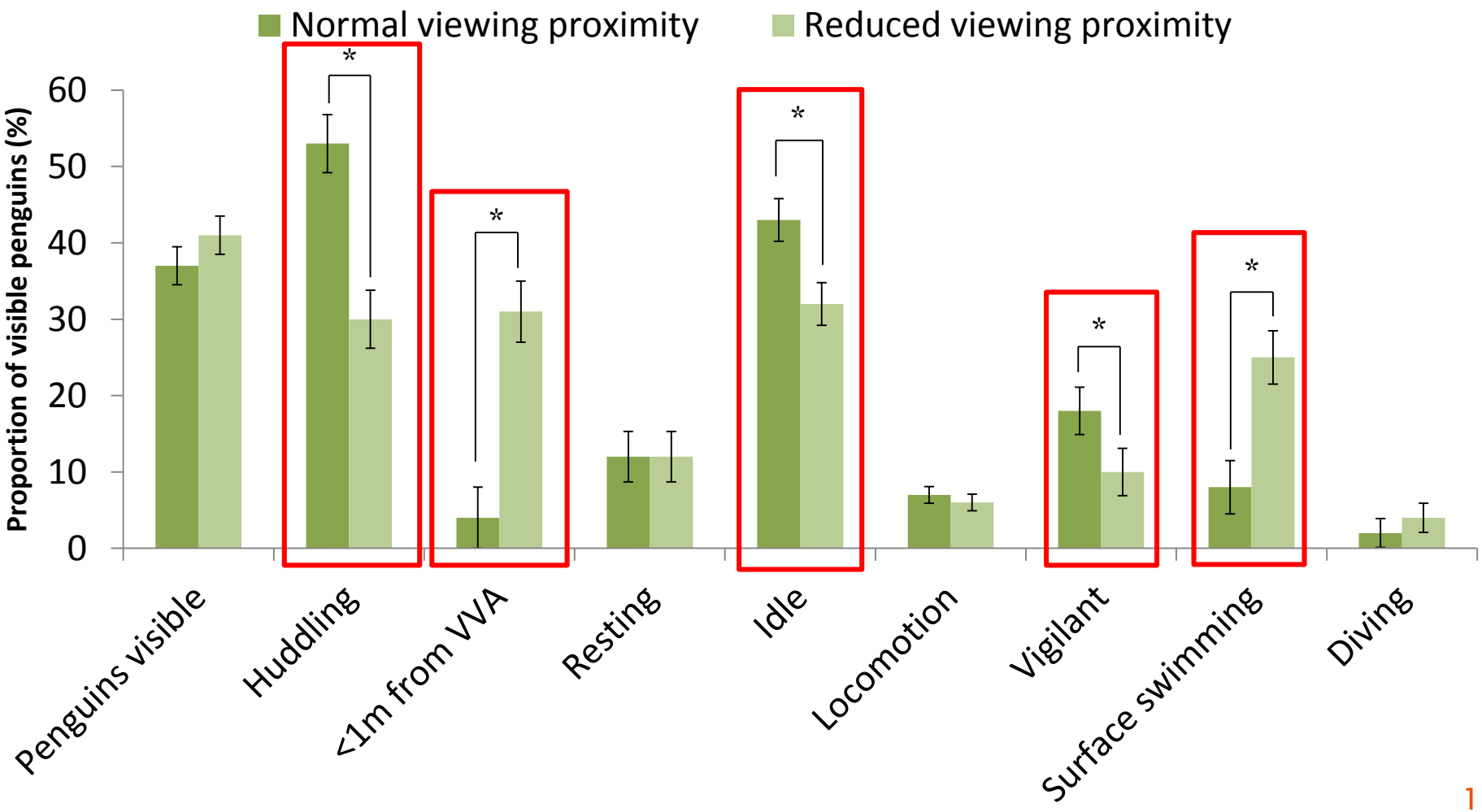
Discussion: Visitors

- Effect of viewing proximity **ONLY**
  - Reduced viewing proximity
    - Reduced visitor behaviours (banging, looming, contact with water, sudden movement)
- Suggests:
  - **Effective** manipulation of visitor-penguin interaction
  - **Effective** manipulation of intensity of visitor behaviour
- Supported by past studies

Results: Penguin behaviour

Open vs. Closed – results were consistent with Sherwen et al. 2015

Results: Effect of viewing proximity



Discussion: Animal

- Strong effect of proximity for on penguin measures
  - Reduced viewing proximity
    - Reduced huddling, vigilance, idle behaviour
    - Increased swimming
    - Closer to visitor viewing areas (VVA)

- Consistent with Sherwen et al. 2015 and eco-tourism studies
  - **<u>Avoidance response: measure of fear</u>**
    - Huddling – defensive strategy to ↓ predator risks/predatory threat (Black *et al.* 2016, Bowen *et al.* 2013)
    - Idle behaviour – reduction could indicate more active
    - Swimming – highly motivated behaviour (innate behaviour)

…..can a management strategy be implemented without affecting visitor experience?

Results: Visitors questionnaires

- Visitors were surveyed after viewing penguin enclosure and exited out of the exhibit area

- Questionnaire data
  - Collected 547 responses by the end of the study
    - 57% non-members, 43% members
    - 69% female, 31% male
    - 83% locals, 21% international visitors

Results: Effect on perceptions between groups

- Treatment 1 = Standard zoo conditions
- Treatment 2 = Barrier
- Treatment 3 = Signs
- Treatment 4 = Barrier + signs

Demographic Factor	**T1**	**T2**	**T3**	**T4**	**Total**
# of participants	114 (20.8%)	193 (35.3%)	117 (21.4%)	123 (22.5%)	547

Rate (1-10)	**Treatments**				Mean ± SD	P-value
	1	2	3	4		
Welfare of the little penguins	7.5	7.6	7.5	7.8	7.60±1.7	0.530
Little penguin enclosure	7.0	6.8	6.6	7.2	6.90±2.1	0.172
Visitor experience at the penguin enclosure	6.7	6.4	6.3	6.4	6.43±2.2	0.627

Results: Visitors attitudes

- Principal Component analyses (PCAs) on attitudinal data
  - Reduces a large set of variables into 'principal components'

Extracted attitude components	**Items**
Negative penguin welfare	• Do you think the penguins are Frightened? • Do you think the penguins are Stressed? • Do you think the penguins are Frustrated? • Do you think the penguins are Anxious? • Do you think the penguins are Subdued? • Do you think the penguins are Bored? • Do you think the penguins are Under-stimulated?

Results: Visitors attitudes

- Identified a total of 13 components (from the 52 attitudinal statements):

1. Positive penguin characteristics
2. Negative penguin characteristics
3. Negative penguin welfare
4. Positive penguin welfare
5. Positive visitor effect
6. Neutral visitor effect
7. Positive enclosure features
8. Negative enclosure features
9. Learning
10. Experience
11. Interests
12. Visual barriers
13. Physical barriers

Results: Visitors attitudes

Extracted attitude components	**Items**
Positive penguin characteristics	• Do you think penguins are Playful? • Do you think penguins are Curious? • Do you think penguins are Interactive? • Do you think penguins are Intelligent? • Do you think penguins are Proactive? • Do you think penguins are Friendly? • Do you think penguins are Social?
Neutral visitor effects	• Do you think penguins find visitors not fear-provoking? • Do you think penguins are unbothered by visitors?
Physical barrier	• Having physical barriers that reduce the proximity between visitors and penguins improves visitor experience. • Having physical barriers that reduce the proximity between visitors and penguins improves penguin welfare.

Implications

- Implementing a physical barrier to reduce the viewing proximity of visitors:
  - Benefits for penguins
    - Less avoidance
    - Reduces fear-provoking visitor behaviours
  - No affect on visitor experience
  - Improves perceptions of penguins
  - Increases perception of neutral visitor effects
  - Neutral affect on their perceptions of physical barriers

Summary

- Aim of PhD: To determine the effects of manipulating visitor-animal interactions on both the animal and visitor

Reduced visitor viewing proximity

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Penguins

↓

↓ Huddling
↓ Vigilance
↓ Idle behaviour
↓ Distance to VVA
↑ Swimming

↓

Visitors

↓

↓ Banging
↓ Looming
↓ Sudden moving
↓ Contact with water
↑ Perceptions of penguins

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