ATTENDING TO AFFECTIVE STATES: Attention Bias as a Measure of Psychological Welfare in Rhesus Macaques

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MEASURING STRESS

• Welfare in captivity is of ever increasing importance
• Measures of stress and signs of poor welfare:
  – Physiological
  – Behavioural
  – Health
• Associated problems
• Psychological measures?
  – Attention bias
ATTENTION BIAS

• The tendency of our perception to be affected by our recurring thoughts and emotions (Bar-Haim et al., 2007, Psych Bull).

• Focus on particular stimuli.

• Predisposed to attend to particular stimuli.
ATTENTION TO FACIAL EXPRESSIONS

• Pre-attentive/Unconscious stage of processing
• Important for social interactions
• Enhances awareness and behavioural responses toward emotionally relevant stimuli
• Threat-related
• Fitness benefit
Attention bias as a welfare measure

- Attention bias towards threatening stimuli is a well-established cognitive correlate of anxiety disorders
- Eye gaze can tell us about an internal state
- Lingering gaze versus avoidance
- Welfare implications
  - Anxiety
  - Captive animals
Tested the attention bias of male rhesus macaques (*Macaca mulatta*) to threatening faces of other males

Findings:

- Sustained attention for threatening facial stimuli
- Avoidance of threatening facial stimuli after a stressful event
  - Possible threshold reached
THE CURRENT PROJECT

This research aims to further develop and validate attention bias as a measure of the psychological state of female captive group-housed, non-human primates, and determine how it can be used as a welfare tool.
METHODOLOGY

• 57 female rhesus macaques at the CFM UK

• Presentation of 3 pairs of stimuli for 3s each
  - Infant
  - Male macaque
  - Infant

• 8 sessions per animal:
  – 4 low stress period
  – 4 high stress period

• Blind testing/blind coding
METHODOLOGY

• Positive-reinforcement training
  – 65 adults (56 females:9 males)
  – 11 social groups of up to 10 adults plus juveniles and infants
  – Never been trained before
  – Couldn’t test or train in isolation
  – All males trained in 2 x 15min sessions
  – 52 females successfully trained to criteria
    • High ranked – 7.5 sessions; mid ranked – 8.1 sessions, low ranked – 18.7 sessions
  – 51 of these females were tested for AB; another 6 not considered properly trained also tested
ADDITIONAL MEASURES

• Behaviour
  – 5 min focal-animal continuous sampling

• Salivary hormones
  – Cortisol
  – Testosterone

• Genetics (Isabelle Szott, coll. Craig Wilding and Hazel Nichols)
  – HTTLPR
  – TPH2
  – OPRM1
  – MAOM
  – DRD
Mean time spent looking at the stimuli

n = 57

- Low stress
- High stress

* indicates statistical significance.

Time spent looking (ms)
RESULTS (prelim)

• Influence of:
  – Treatment
  – Hierarchy
  – Presence of an adult male
  – Breeding status
  – Genotype
Effect of hierarchy position on mean time spent looking at the threatening stimuli

- High rank
- Mid rank
- Low rank

Time spent looking (ms)

- Low stress
- High stress

$T > N$
Are middle ranking females at greatest risk of developing “clinical anxiety”?

Does attention bias identify this?
BEHAVIOUR RESULTS (prelim)

- Behaviours: Aggressive approach, Affiliative approach, Fear avoidance, Self directed/anxiety, Maintenance
- Stress conditions: Low stress, High stress

Legend:
- Low stress
- High stress

Self directed
Body shake
Yawn
Vigilance
DISCUSSION

• Vigilance for threatening facial stimuli
• Stress = avoidance (esp. mid ranks)
• ↑ self-directed, anxiety behaviours
• ↓ maintenance behaviours

• Is avoidance a welfare indicator?
DISCUSSION

• Range of responses
  – Individual relevance?

• Now looking at the effect of other types of stressors and stimuli on attention bias

• Habituation of stressors

• Development of a user-friendly testing system

• Eye gaze tracking software development
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New website on macaque behaviour and care

- www.macaquewebsite.com
- Practical guidance, peer reviewed and referenced
- Over 200 images and videos

- Improve your knowledge of macaque behaviour
- View best practice in captive management (e.g. housing, enrichment, training)
- Utilise tools for welfare assessment