How Bold are Wild Asian Elephants (*Elephas maximus)* in a Human-Dominated Landscape?

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BACKGROUND

- **Human-elephant conflict (HEC) –** elephants enter anthropogenic settlements and often raid croplands due to loss of natural habitat resources
- **Predator playbacks**: investigate antipredator response behavior
  - Typically for auditory discrimination
  - Potential application for (HEC) – elicit fear to deter crop-raiding behavior[1]
- **Personality**: individuals' behavioral differences that persist over time and are consistent across contexts
  - **Shyness-Boldness:** a measure of reaction to a known risky situation[2]
  - Boldness toward predators is beneficial when resources are limited[3]
  - HEC mitigation techniques should account for elephant personality and behavior
- We measured individual variability in behavioral responses to natural and anthropogenic predator signals

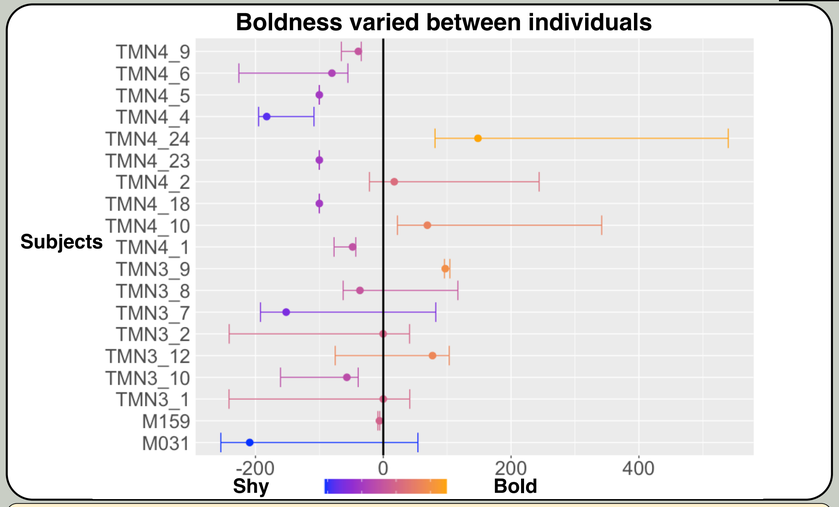
QUESTIONS & HYPOTHESES

- **Q1**: How do wild Asian elephants' behavioral responses to predator vocalizations vary by individual?
- **H1**: Boldness, a personality trait, will vary between individuals across multiple conditions of playbacks.
- **Q2**: Do human shouts elicit comparable behavioral responses to natural predator vocalizations?
- **H2:** Due to rapid anthropogenic developments near wildlife habitats, elephants will retreat (or inhibit locomotion) more frequently from human shouts than predator vocalizations.

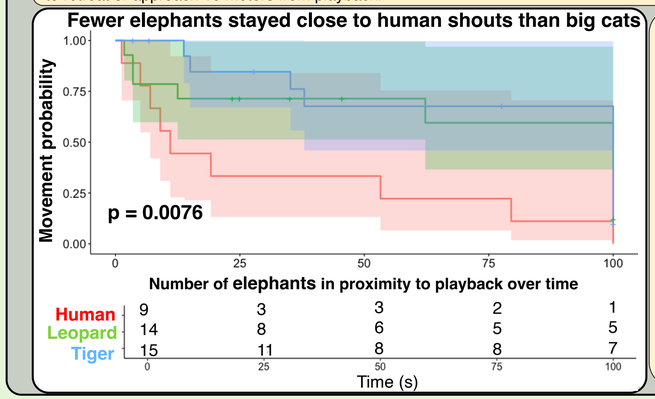
METHODS

- **Setting:** Human-dominated landscape: agricultural village in Thailand bordering wildlife sanctuary
- **Materials:** "Boombox"[4]: Arduino-based automatic acoustic playback unit with camera trap (CT)
  - Predator vocalization conditions:
    - Human shouts (Thai rangers)
    - Leopard growls
    - Tiger roars
- **Procedure**: Set up 10-meter radius to determine movement toward and away from the Boombox following predator playback exposure
  - Analyzing first response to two conditions

RESULTS



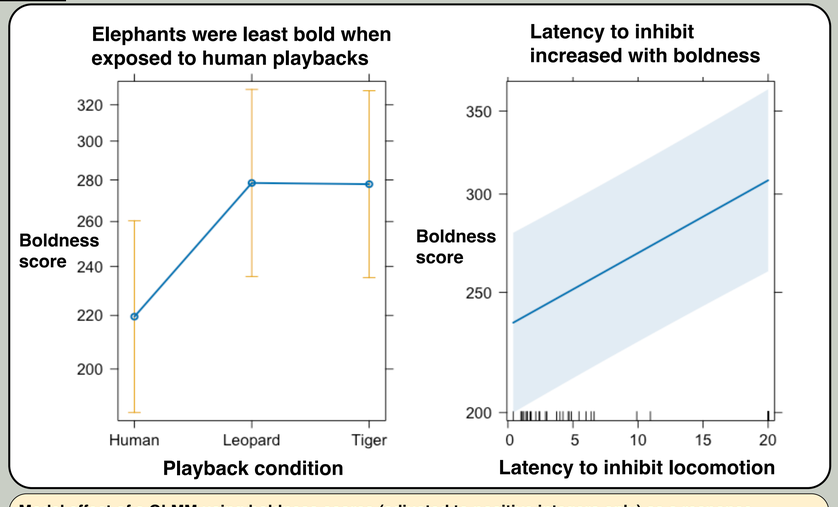
Means and standard deviations between first and second observation of individual elephant's response to predator playback. Boldness scores represent ordinally ranked data based on a formula weighing latencies to retreat or approach 10 meters from playback.



Cox proportional hazard test for elephants' probability to stay near or approach playback source. Elephants at 100 seconds either stayed within 10 meters of playback or approached within that duration.

Concordance = 0.671 (*SE = 0.051*)

- Likelihood ratio test = 6.71 *p = 0.03*
- Wald test = 7.74, *p = 0.02*
- Score (logrank) test = 8.57 *p = 0.01*



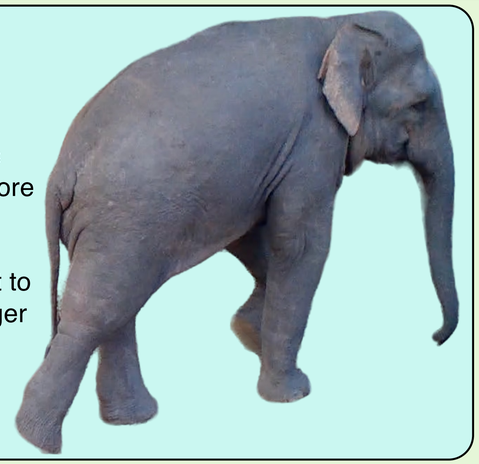
Model effect of a GLMM using boldness scores (adjusted to positive integers only) as a response variable, predator playback condition and latency to inhibit locomotion as fixed effects, and subject ID as a random effect. The effect of human shouts on boldness scores and latency to inhibit locomotion was significant compared to the natural predator conditions (*SE = 0.08, Z = 59.669, P < 0.0001*). Leopard and tiger boldness scores were also strongly correlated (*r = 0.723*).

Photo from camera trap footage capturing wild male Asian elephant "M159" after exposure to human vocalization.

The elephant has inhibited locomotion, which often occurs with a front leg lift following exposure to predator playback.

DISCUSSION

- Elephants demonstrate individual variability in response to different predator playbacks.
- Correlations between some individuals and natural predator conditions suggest boldness may be a personality trait in wild Asian elephants. More data is needed to compare variability.
- Elephants inhibit locomotive behaviors and retreat more quickly or wait to approach more slowly when exposed to human shouts compared to tiger roars or leopard growls.
- Humans may present a greater threat to elephant survival than natural predators.



ACKNOWLEDGEMENTS

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