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Influence of the presence and behavior of visitors on captive orangutans

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MÉNAGERIE
ZOO DU JARDIN
DES PLANTES

MUSÉE
DE L'HOMME

anr PRIMA ZOO [ANR-21-CE03-0003-01]

Objectives

1. Enrich the current knowledge about the influence of visitors on orangutan welfare in zoological parks.
2. Develop a cognitive-bias protocol for orangutans.

Do the presence, number and attitude of visitors affect behavioral activities, spatial use and emotional state of zoo orangutans ?

Zoo animals are permanently exposed to the public: understanding whether and how visitors affect them is necessary to improve their living conditions.

There is little literature on the influence of visitors on zoo orangutans, the existing one showing contrasting results [1]. Most of the studies focuses on visitor presence or number, with few examining the other variables such as noise level and attitude [2]. Moreover, zoo-based animal welfare studies mainly rely on behavioral observations [3], which interpretation is often ambiguous. Hence, it is necessary to enrich the knowledge concerning visitor effects on orangutans, while elaborating new non-invasive and objective methods

Study model: Five Bornean orangutans (*Pongo pygmaeus*; 1 adult male, 3 adult females and 1 juvenile female), among which four captive-born and one wild-born in Borneo, housed at La Ménagerie, le zoo du Jardin des Plantes (MNHN, Paris).



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[1] Sherwen & Hemsworth, 2019. Animals 9; 366.; [2] Choo, 2011. Appl Anim Welf Sci. 133: 78-86.; [3] Binding, Farmer, Krusin & Cronin, 2020. JZAR, 8, 166-174.

Methods

Study 1: Behavioral observations in spontaneous conditions (n=5 ind.)

Measured parameters:

- **Behavioral activities :** presence of behaviors ⁽¹⁾
- **Space use :**
 - depth^(2,3) (horizontal distance to the glass)
 - height^(2,3) (vertical distance to the ground)
- **Visitor data :**
 - daily visitors (daily number of visitors in the zoo)
 - crowd size⁽²⁾ (number of visitors in front of enclosure)
 - attitude⁽¹⁾ (active/passive toward the orangutans)
 - noise level (average decibels during 1 minute sampling)



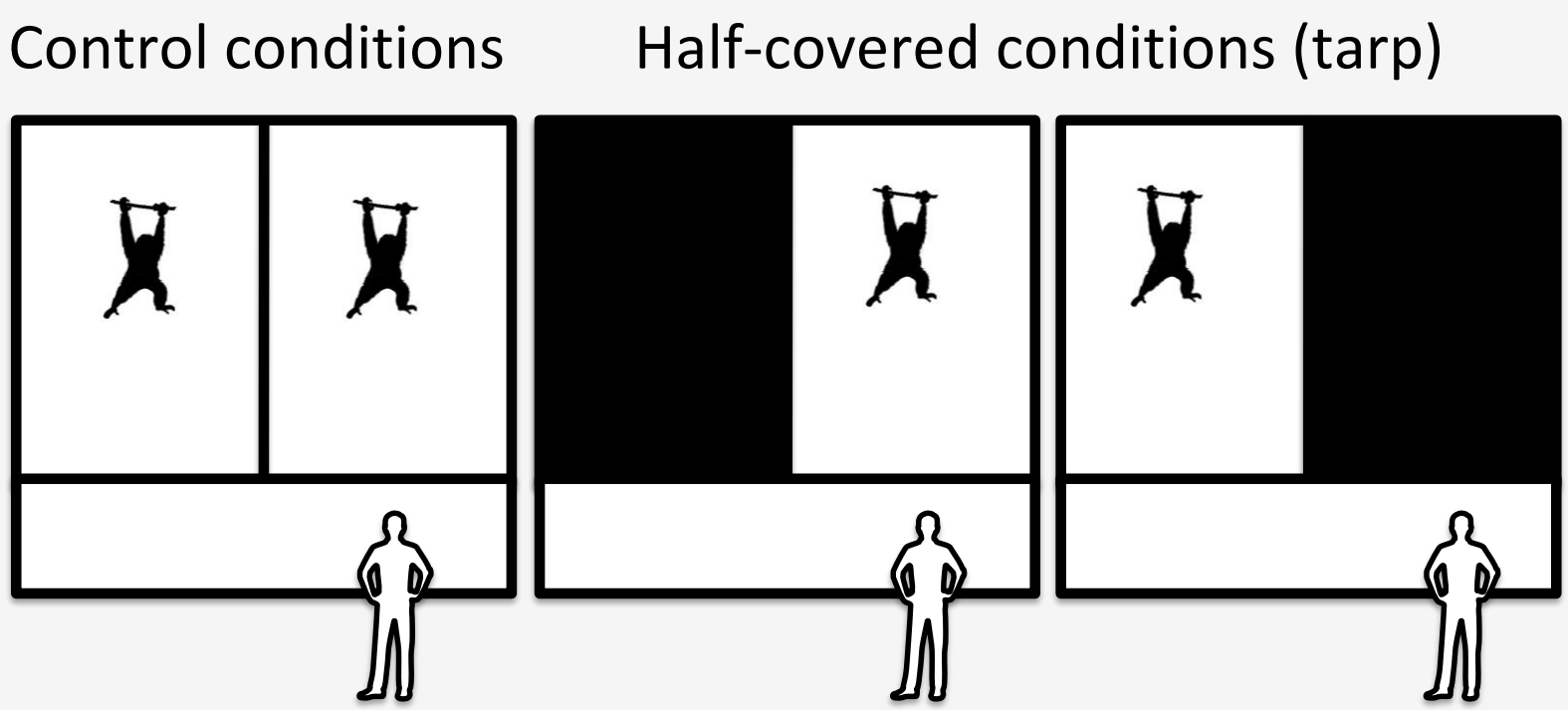
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Statistical tests: GLMM for binomial data (fixed factors: visitor data; random factor: individual orangutan)

Observation methods : ⁽¹⁾ 4-minute focal-animal samplings; ⁽²⁾ instantaneous-scan sampling every 5 min
⁽³⁾ Front and bottom areas are the closest to the visitor gallery

Study 2: Spatial preference test (n=4 ind.)

Experimental conditions: tarpaulin on half of the glass



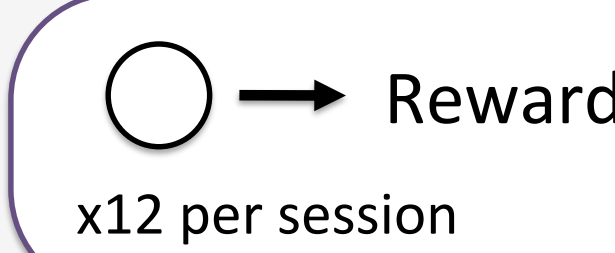
Measured parameters:

- **Behavioral activities :** presence of behaviors⁽¹⁾
- **Space use :** side, depth, height, orientation^(2,3)
- **Visitor data :** crowd size⁽²⁾, daily visitors

Study 3: Optimism test (n=3 ind.)

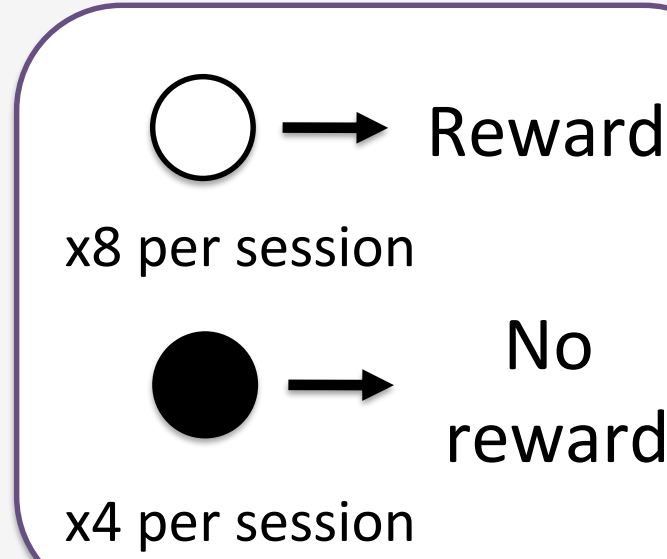
Apparatus : visual 'Go/No-Go' design
(presentation of a colored upside down cup by caretakers)

Phase 1: Begging training



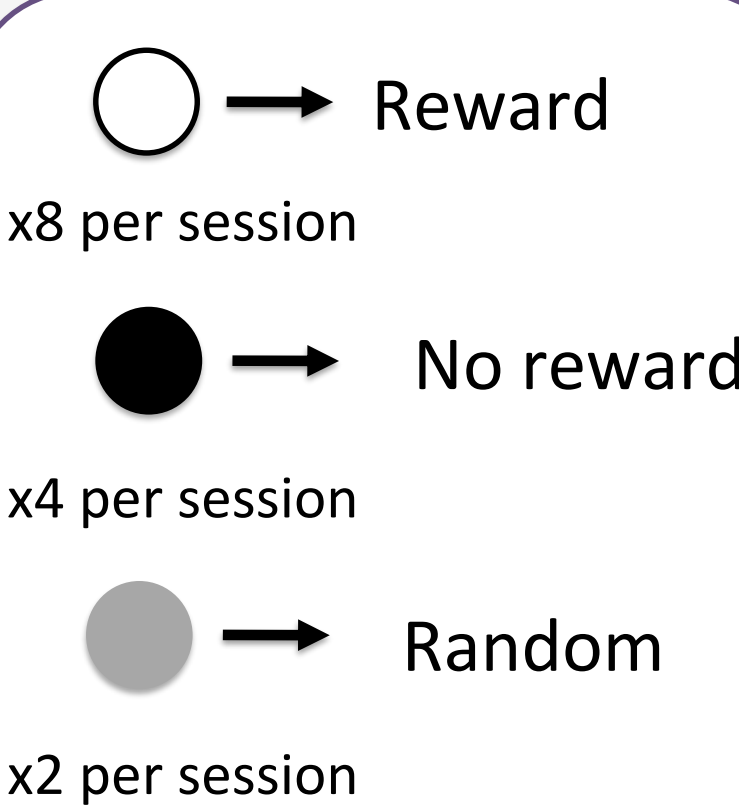
Criterion:
10/12 beggings

Phase 2: Discrimination training



Criterion:
Significantly different
begging latencies

Phase 3: Testing



Measured parameters:

- **Begging latency**
- **Daily visitors**

Statistical tests: mixed effect cox model

fixed factors: color of the cup, daily visitors;
random factors: session number, trial number

Results

NS: P>0.05; *: P≤0.05; **: P≤0.01; ***: P≤0.001

Study 1

Behavioral activities:

	Exploration	Locomotion	Affiliative contacts	Glances outside	Self-centered
Daily visitors	+ (***)	+ (**)	NS	NS	NS
Crowd size	NS	NS	+ (**)	+ (**)	NS
Active attitude	NS	+ (**)	NS	+ (**)	NS

Space use:

- ⬆ **Daily visitors:** no effect
- ⬆ **Crowd size:** ⬆ time spent in bottom (***) and front (***)
- ⬆ **Noise level:** ⬆ time spent in bottom (***) and front (***) of the enclosure

Orangutans were more active and they gazed at and approached more the visitor area when crowds were large, noisy and active toward the orangutans.

Study 2

Presence of a visual barrier:

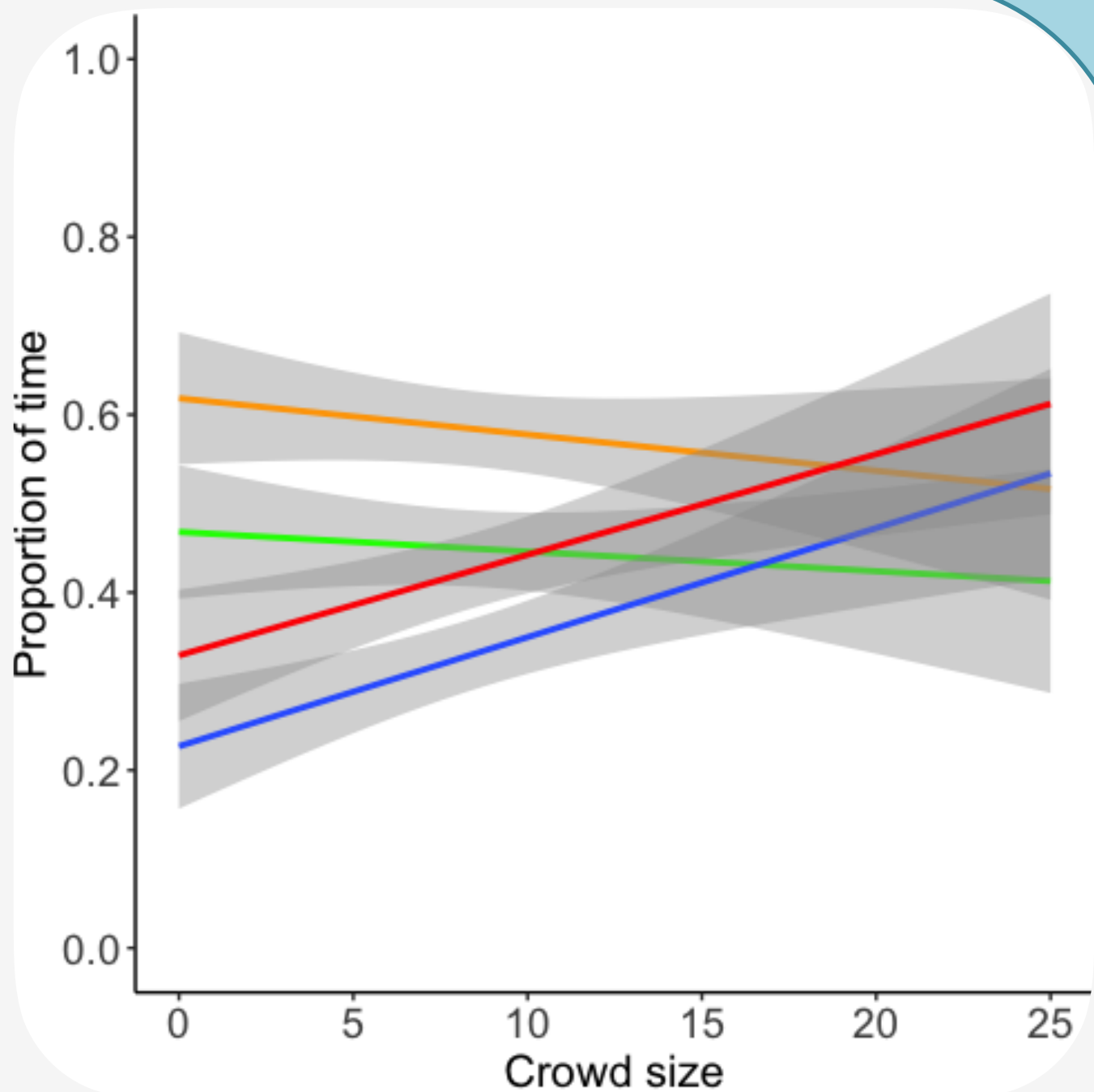
- Preference for the uncovered side (***)
- ⬇ time spent in the bottom (***) and front (***) of the enclosure

Visitors:

- ⬆ **Crowd size:** ⬆ time spent in the bottom (***) and front (***) of the enclosure
- No influence of visitors on orientation and side

Orangutans preferred to be in visual contact with the visitor area, regardless of the crowd size.

➡ **When orangutans were offered a hiding choice, they used space more homogeneously**



Proportions of time spent in the bottom half (blue, ***), the front half (red, ***) and the uncovered side (orange, NS) of the enclosure, and oriented toward visitors (green, NS), as a function of crowd size. Grey areas: standard errors.

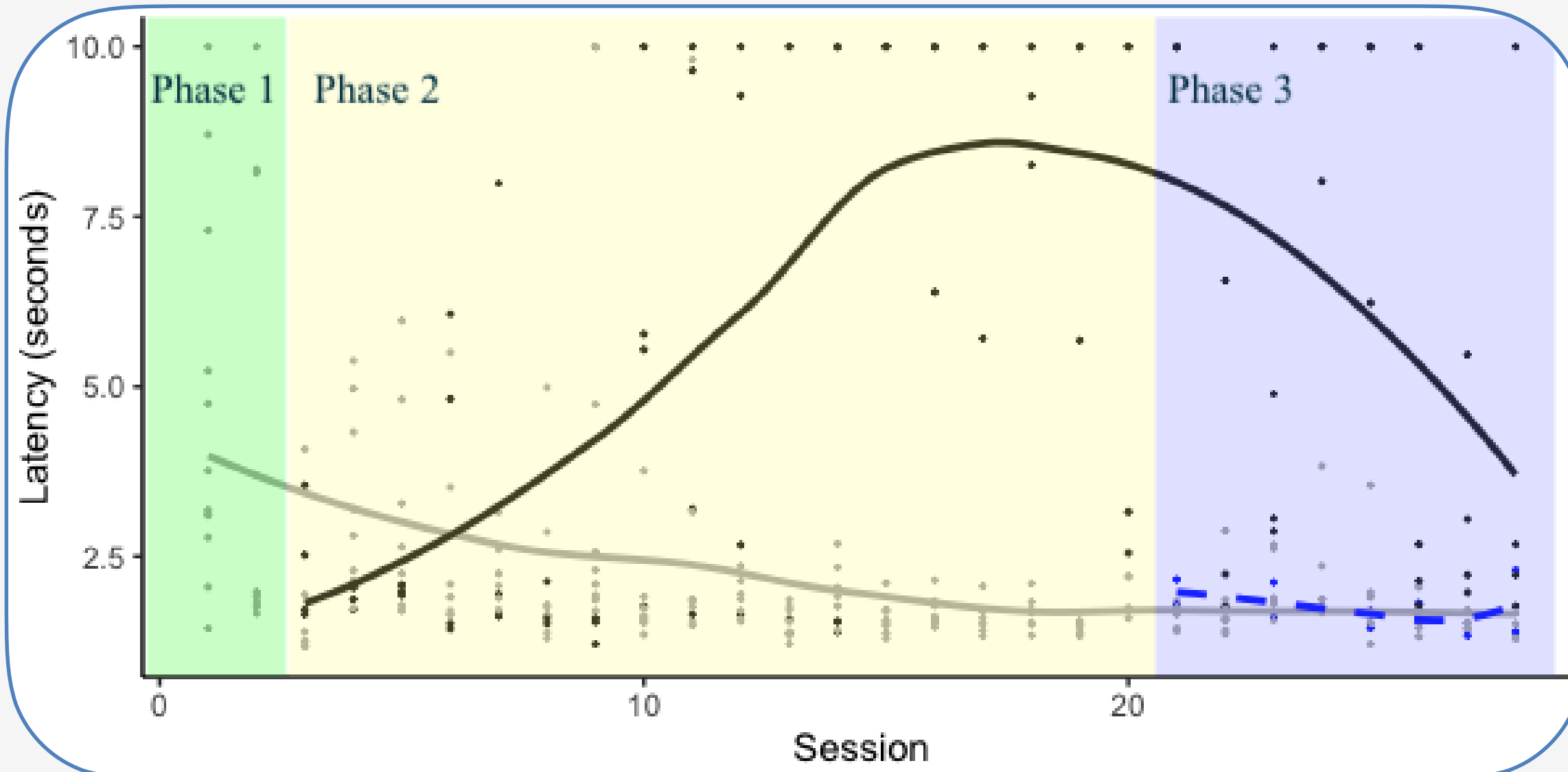
Study 3

Discrimination : 1/3 individual reached the criterion

• Response to stimuli (color of the cup) during testing:

- latency for positive signal < latency for negative signal (***)
- latency for ambiguous signal < latency for negative signal (***)

• Visitor influence: no significant effect of daily visitors on latencies



Latencies to beg for the positive (light grey), negative (black) and ambiguous (blue, dashed) signals, in each trial of the training and testing sessions. N=1 individual (adult male, Banggi)

➡ **Banggi, the adult male, seems to be an optimist individual (but habituation)**
No further insights about perception of visitors: improvement of the protocol is needed.

The orangutans at La Menagerie, le zoo du Jardin des Plantes, showed **no aversion to the public but rather an interest in the visitor area**, suggesting a **positive perception of visitors**. Their spatial use in a preference test emphasizes the importance of providing zoo orangutans with more **choice to retreat**. There is however a need to identify **new reliable indicators of well-being in zoo animals** in order to be able to objectively assess the relationship between visitors and zoo orangutans.