

In this case study titled „*Globally Popular Pet Reptile Leopard Gecko (Eublepharis macularius) Demonstrates Capability in Using Running Wheel Voluntarily – Is It Locomotion Play?*“ the author Richard Digirolamo analyses the interaction behaviour of his pet gecko with a provided running wheel as part of its enclosure over the course of several days. He comes to the conclusion that the observed behaviour fulfils the criteria of play and discusses its implications for pet reptile welfare.


This study is well written, planned and executed and adds to the growing body of work finding play-like behaviour across the animal kingdom. The author is very open about the limitations of this study, foremost that it is a single case study. Given the novelty of describing play-like behaviour in pet reptiles (which has only been anecdotal before) and the systematic execution of the study I believe that this work should be made available. The author integrates his work well within the existing body of the literature and discusses the results in an adequate critical tone.

The methods are described in sufficient detail; for the results I would wish for a re-analysis and presentation of the data with higher temporal resolution, which should be possible without too much additional effort (maybe hours or 30 min instead of days, to see circadian dynamics).


Below I've made a few remarks that might improve the report:

#### Abstract


„Leopard Geckos are known to react towards novel enrichment items, and anecdotal observation by pet owners report their high activeness and play-like behaviour.“

- The first part should be supported by a suitable reference (the references Bas  et al., 2016 and Zieliński, 2023 are used for this statement in the discussion), or included in the anecdotal observation part.


„Thus contradictory to their small size, they may have high activity levels and enough energy resources to play when given the right environment.“

- The author refers to the fact that sufficient energy reserves are a prerequisite for play-like behaviour, but I am not aware of any correlation of activity level and body size. Either a reference is provided or this sentence should be reformulated. 

„The Leopard Gecko interacted with the wheel up to 36% per measured day, with up to 47 play episodes per measured day.“


- Since play behaviour in Geckos is not established yet, the term ‘play’ is better avoided in this sentence (i.e. “wheel interactions”). 

„The highest total distance measured by the cycle counter was 560 meters per measured day.“


- It should be mentioned here that apparently nothing is known about wild leopard geckos and their daily activity (range). Is there any information at all on activity pattern/range in comparable reptiles? Anything would help to put this into perspective. Also, please see the comment in the Material & Methods section. 

#### Introduction

- To emphasize the broad occurrence of individual play-like behaviour in the animal kingdom, the author could include insect examples (e.g. Galpayage et al. Animal



Behaviour 2022, Triphan & Huetteroth bioRxiv 2023). To include social play among arthropods, the author could consider citing Huber 1820, Dapporto et al. J Comp Psychol 2006, and Pruitt et al. Ethology 2012. 

#### Material and Methods

- It should be noted if and how the cycle counts were calibrated to the running wheel diameter to properly represent travelled distance. The circumference based on the diameter is 597 mm, not 597 cm, so I wonder if the mentioned distances (i.e. in figure 5 and elsewhere) need to be reduced by a factor 10. 

#### Results:

The table records information up to day 21, while the figures 4&5 include only data up until 14 days.

- I understand that the video recording only covers these first 14 days. This is a pity for figure 4&5 though, since there seems to be another activity bout after shedding (day 10-14). Also, it seems the wheel interaction is anti-correlated with feeding events (in fact, the author hints at this in the discussion). To make this association clearer, it would help to indicate feeding events in the figures. I also would urge the author to present the data for 21 days, and maybe mark which period is additionally covered by video recording. 
- Since the gecko is night-active, it would be of additional value to know the circadian relation of the activity bouts. Do they occur mostly at specific times during the night? Does the original data warrant higher temporal resolution (i.e. 1 data point/30 min or 1h) of the figures? 

The motion detection of the camera recorded 35h of motion during the observed 14 days.



- Again, can this activity be put into relation to any existing activity data for reptiles of comparable size and/or natural habitat (i.e. is this representative/typical)? If not, this could be mentioned in the results section already. 


Figure 6 mentions that day 4 and days 9-14 were excluded due to inactivity. 

- The table mentions no activity for day 5 and 10-14. I believe this is a rounding issue which would also disappear with higher temporal resolution of the x axis.

Figure 7 mentions day 2 as the “most active day”. 

- What is this based on? Just wheel engagement time or additional movement outside the running wheel? It would be helpful to include the movement outside the running wheel in figure 4&5.

“No running was observed.”

- I am no reptile expert, but it is my understanding that leopard geckos can run, especially when younger. It would be helpful to elaborate on the running abilities of Leopard geckos to put this observation into perspective. (Do leopard geckos run in larger terraria?) 

„Figure 4 shows the number of play episodes of the gecko on each observation day and its correlation with the gecko's total time engaged in the wheel.“

- “Wheel interaction episodes” instead of “play episodes”
- Please check if the travelled distance is properly calculated from the odometer readings (see comment in Material & Methods section).

Figure 6: The amount of time spent in the running wheel is striking, given the overall time of activity.

- I wonder if this could be visualized even better with a different color code (resting time in black/grey, and active phases in different colors). When does “interacting with the wheel” start? When all four legs are inside the wheel, as described above?

Discussion

- “species” is used for both singular and plural and should replace “specie” throughout the manuscript.
- “Criteria 1-5” should be changed to singular “Criterium 1-5”

Criterium 2: “The number of play episodes, total engagement time in the wheel and the total distance (...)”

- “play episodes” should be changed to “wheel interaction episodes”

“Further studies using a higher number of animals under different life-stage and sex of the animal is required.”

- This is an important statement; it could be expanded by mentioning that younger animals exhibit higher engagement in most observed play behaviours (i.e. see discussion in Galpayage et al., Animal Behaviour 2022).