Characterization of a novel stereotypic behavior in laboratory gerbils (*Meriones unguiculatus*)

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Introduction

Mongolian gerbils (*Meriones unguiculatus*) have served as a common model for neurologic and auditory research for more than 50 years.[1]

Stereotypy: morphologically identical movement that is regularly repeated and seems purposeless or aberrant.[2]

Historically, only corner digging and bar gnawing have been reported as stereotypic behaviors in gerbils.[3,4]

- Digging: 7 or more non-productive scratches or lasting longer than 12 seconds
- Bar-gnawing: grasping a bar between the teeth and moving along the bar while chewing

At our institution, gerbils exhibit repetitive and purposeless corner jumping which has not previously been described as a stereotypy in this species.

Materials and Methods

- SQ11 Mini DV cameras (nanny cams with local recording capability)
- 32 or 64 GB microSD cards (6 or 10-12 hours of continuous recording)
- Free, open source behavioral analysis software: Behavioral Observation Research Interactive Software (BORIS)[5] http://www.boris.unito.it

1. Two cameras set up to record an IVC rack housing 17 breeding gerbil pairs + offspring.
2. Baseline – for 5 days, 30-minute video segments at 3 time points:
   AM ≈ 0630, beginning of the light cycle
   NOON ≈ 1230, mid-day
   PM ≈ 1930, end of the light cycle
3. Video coded manually in BORIS for corner jumping and corner-digging stereotypies.
4. Incidence of repetitive jumping, corner digging, and the combined behaviors were compared at different time points.
5. Jump counts during the most active period evaluated over 4 weeks to identify patterns in the study population over time.

Figure 1: Camera with finger for scale. Scan or click QR code for example of behavior video recording.

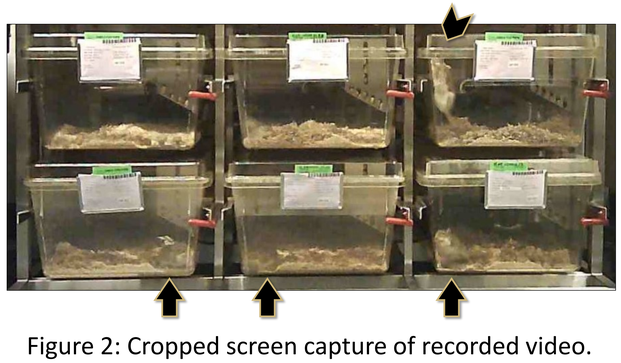

Figure 2: Cropped screen capture of recorded video. Note that gerbils in the three bottom cages are corner digging (arrows) and one in the upper row is jumping (arrowhead).

Results

Table 1: Jumps during baseline period, by breeder cage and time of day

Cage #	236	237	239	240	241	242	243	244	245	247	248	250	251	252	253	254	255
AM	0	0	0	0	0	0	0	0	0	0	51	18	0	12	169	0	0
Noon	0	0	0	0	0	0	3	0	0	0	2	13	154	60	0	0	10
PM	29	19	35	45	9	0	157	9	311	57	39	334	358	294	57	39	23

Total jumps were highest at the end of the light cycle compared to early morning and mid-day observation periods ($p < 0.0001$, Friedman test).

Table 2: Total PM Jumps over 4 weeks, by breeder cage

Cage #	236	237	239	240	241	242	243	244	245	247	248	250	251	252	253	254	255
Jump count	144	28	302	187	372	20	**610**	76	**701**	242	231	**1862**	**606**	**896**	**744**	374	194
% of total	1.9	0.4	4.0	2.5	4.9	0.3	**8.0**	1.0	**9.2**	3.2	3.0	**24.5**	**8.0**	**11.8**	**9.8**	4.9	2.6

All breeding pairs engaged in repetitive jumping, but 6 of the 17 pairs (bolded) accounted for 71.4% of all evening jumps recorded over 4 weeks of observation (5,419/7,589).

Baseline period: Jumps and association with stereotypic digging

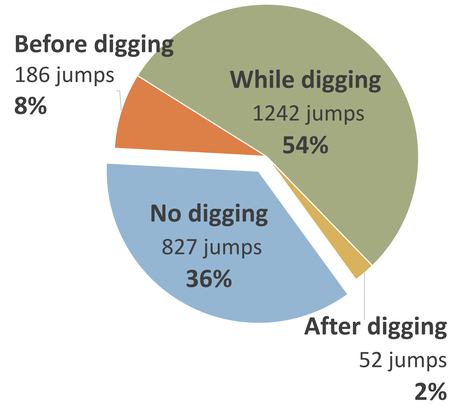

Figure 3: 64% of jumps at any time of day (1,480/2,307) were associated with a corner-digging event.

Discussion

Video monitoring allowed objective evaluation of a repetitive behavior pattern in gerbils.

Repetitive corner jumping is a common stereotypy within our gerbil breeding colony. The frequency of jumping is not equally distributed across all breeding cages.

The high incidence of jumping in the evenings could be associated with an unknown environmental trigger or related to an increase in general activity during this period.

Confirming anecdotal observations, corner jumping is often associated with stereotypic corner digging behavior. It is possible that jumping has become part of the same perseverated behavior sequence, or the behaviors may share similar (unknown) triggers.

Future studies will assess potential interventions to reduce this novel stereotypic behavior.

Acknowledgements and References

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