

LABORAS System Validation: Using Orexin-A Induced Grooming

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Introduction

- Recently, an automatic behaviour classification system, LABORAS (Laboratory Animal Behaviour Observation, Registration and Analysis System) ¹ [Figure 1], has been developed to register a variety of behaviours in mice and rats.
- This system transposes the movements (mechanical vibrations) of an individually housed experimental animal into electrical signals, which are scored by a computer in accordance with amplitude and frequency. Each movement has its own unique algorithm.
- The following study was undertaken to investigate the accuracy to which the LABORAS system can assess grooming behaviour in rats treated with both vehicle and orexin-A (3µg, ICV).

Materials and Methods

Animals and Surgery Male Sprague Dawley rats (280-320g) were implanted with an indwelling cannula into the lateral ventricle (co-ordinates: AP -0.8mm; ML ± 1.6mm; DV -4.1mm, Paxinos and Watson 1986).

Behavioural Testing Rats were individually habituated to the clear perspex test cage at least 10 min prior to behavioural monitoring. Immediately prior to the assessment of grooming behaviour, rats were injected ICV with either vehicle (water) or orexin-A (3µg). Animal behaviour was then captured over a 50 minute test period by LABORAS. Simultaneously, each animal was recorded on video and later scored by two independent observers.

Results

- Both LABORAS and observers detected a significant increase in grooming in the rat ($P < 0.05$), following administration of orexin-A (3µg, ICV). [Figure 2].
- However, a significant difference between LABORAS and observer scores, was noted for individual animals treated with either vehicle or orexin-A ($P > 0.05$). [Figure 2]
- Although, LABORAS consistently scored grooming at a higher rate than that of the observers. [Figure 3], the percentage increase in groom time on administration of orexin -A, was comparable for both systems [LABORAS 72%, Observers 71%].

Figure 1. The LABORAS behaviour registration system. Sensor platform with cage.

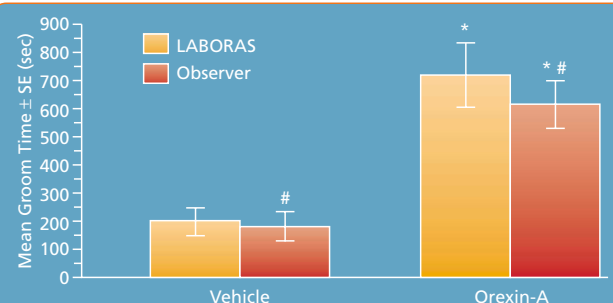
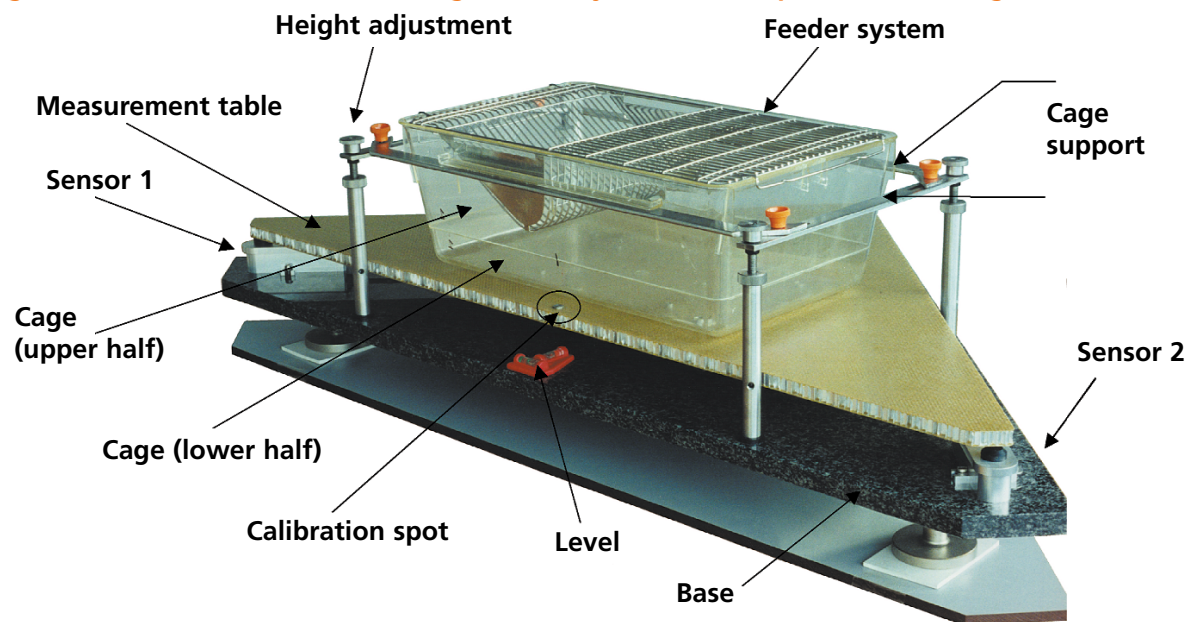


Figure 2. LABORAS and observer (n=2) assessed grooming behaviour in rats treated with both vehicle and Orexin-A (3mg, ICV, n = 4). Data was captured as total groom time and is represented as mean ± SE. * $P < 0.05$ compared to vehicle treated animals, # $P > 0.05$ compared to LABORAS; using LSD test following a significant within subject two-way ANOVA [$F(1,3)=12.91$, $P=0.037$] and [$F(1,7)=10.18$, $P=0.015$], for vehicle and orexin-A treated animals, respectively.

Summary

- In accord with previous reports ^{2,3}, orexin-A was shown to produce a robust increase in grooming behaviour in the rat, by both scoring systems.
- The higher response ratio (1.15 times) of LABORAS may be due to advanced accuracy and sensitivity of the system, which is also devoid of intra- and inter-observer deviations.
- The results therefore suggest a positive correlation between these two scoring systems, indicating LABORAS as a reliable system for automated registration of grooming.

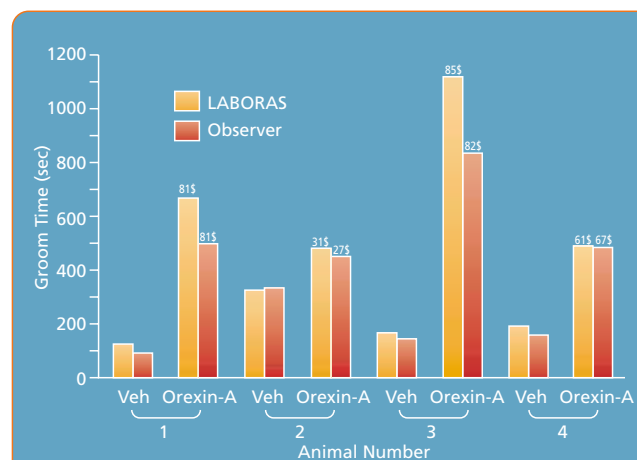


Figure 3. Time spent grooming for individual animals, as recorded by LABORAS and observers. \$ Percentage increase in grooming score compared to vehicle.

References

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