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SJSU NASA

A summary of:
Collecting Sleep, Circadian, Fatigue, and Performance Data in Complex Operational Environments

Presented by:
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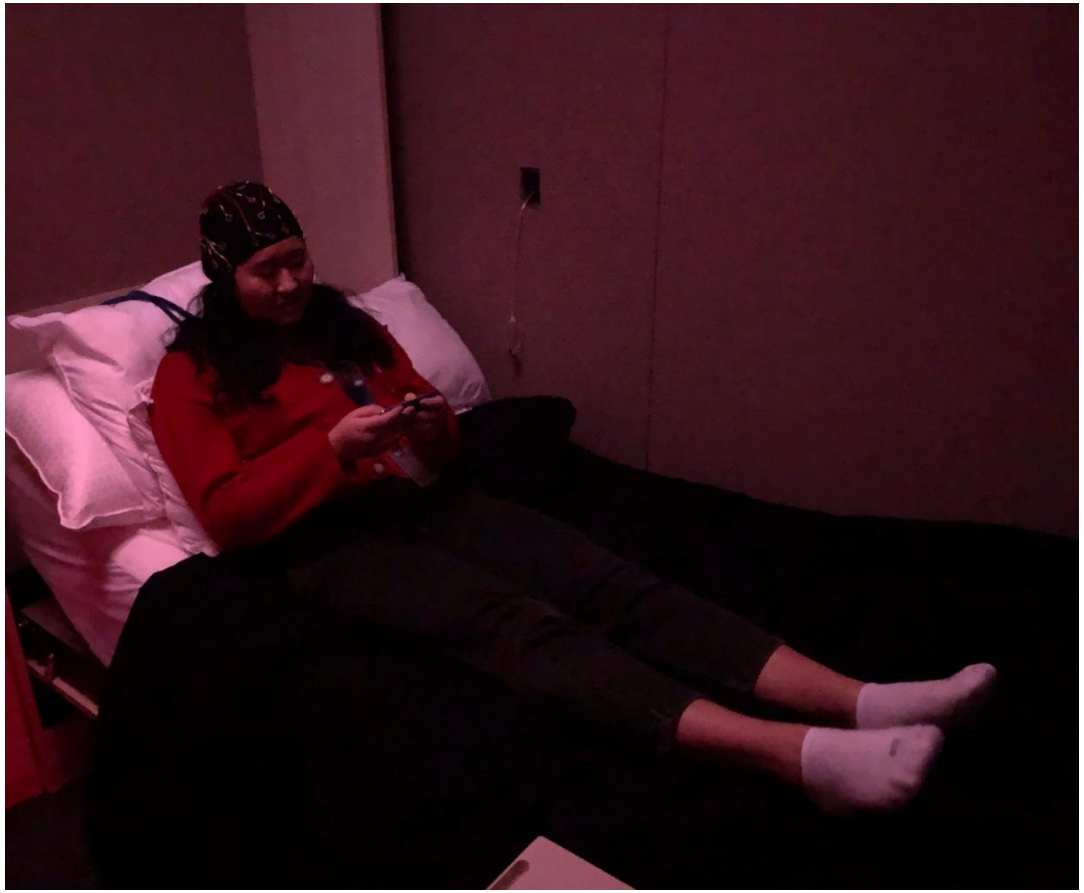
Arsintescu, L., Kato, K. H., Hilditch, C. J., Gregory, K. B., Flynn-Evans, E. Collecting Sleep, Circadian, Fatigue, and Performance Data in Complex Operational Environments. *J. Vis. Exp.* (150), e59851, doi:10.3791/59851 (2019).

What is JoVE?

- Journal of Visualized Experiments
- Peer-reviewed
- Experimental methods in video format (and text)
- A LOT of wet lab articles

In-lab sleep & circadian studies

- Carefully screened participants
- Strictly controlled environment
  - Light
  - Posture
  - Energy intake
  - Ambient temperature
  - Distraction-free
- Investigate influence of sleep and circadian rhythms on novel measures
  - COBRA (eye tracking)
- Validate measures to use in the field
  - PVT touchscreen app



Personal photo

Aim: Describe fatigue field work methods

Unique challenges

- Tips for collecting robust, complete data
- Prevent common pitfalls

- Help industry collect data in-house
- Confidence in data
- Assess effectiveness of fatigue mngt strategies

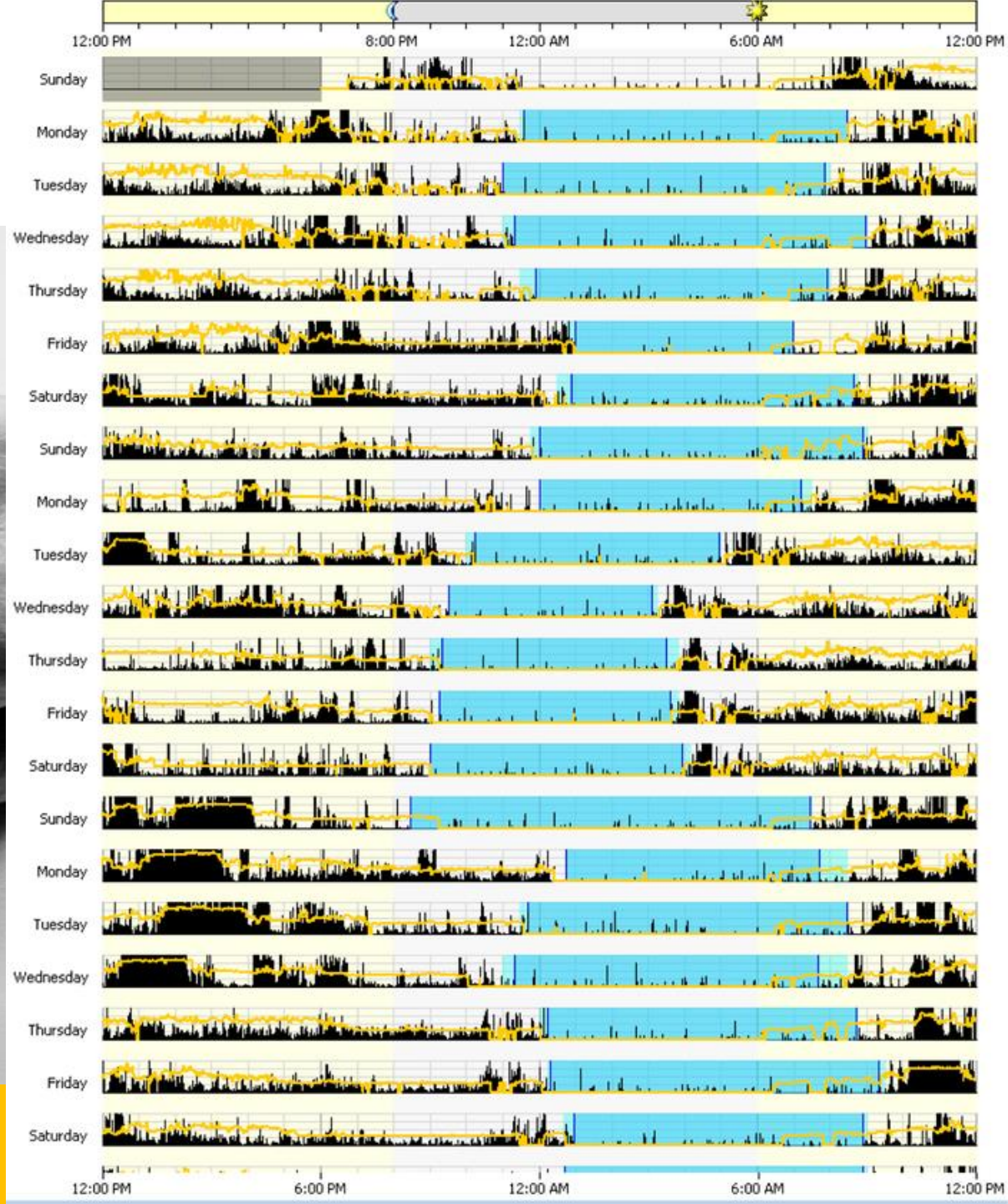
Collecting sleep data in complex environments

- Operational example: commercial aviation
- Methods:
  - “Tips”
  - Actigraphy
  - App-based Sleep Diary and Questionnaires
  - PVT
  - Urine collection
- Results: example results using these techniques

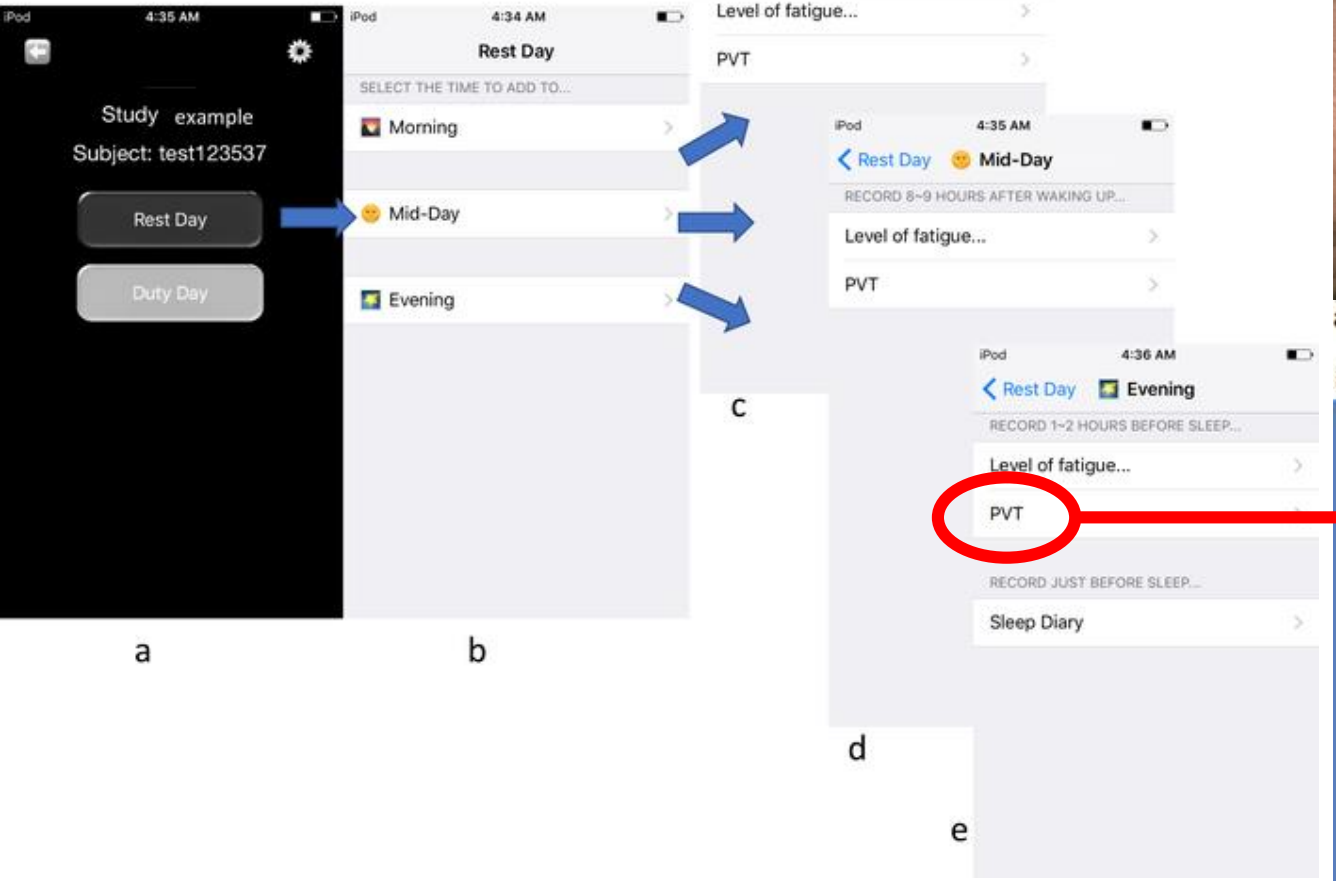
“Tips”

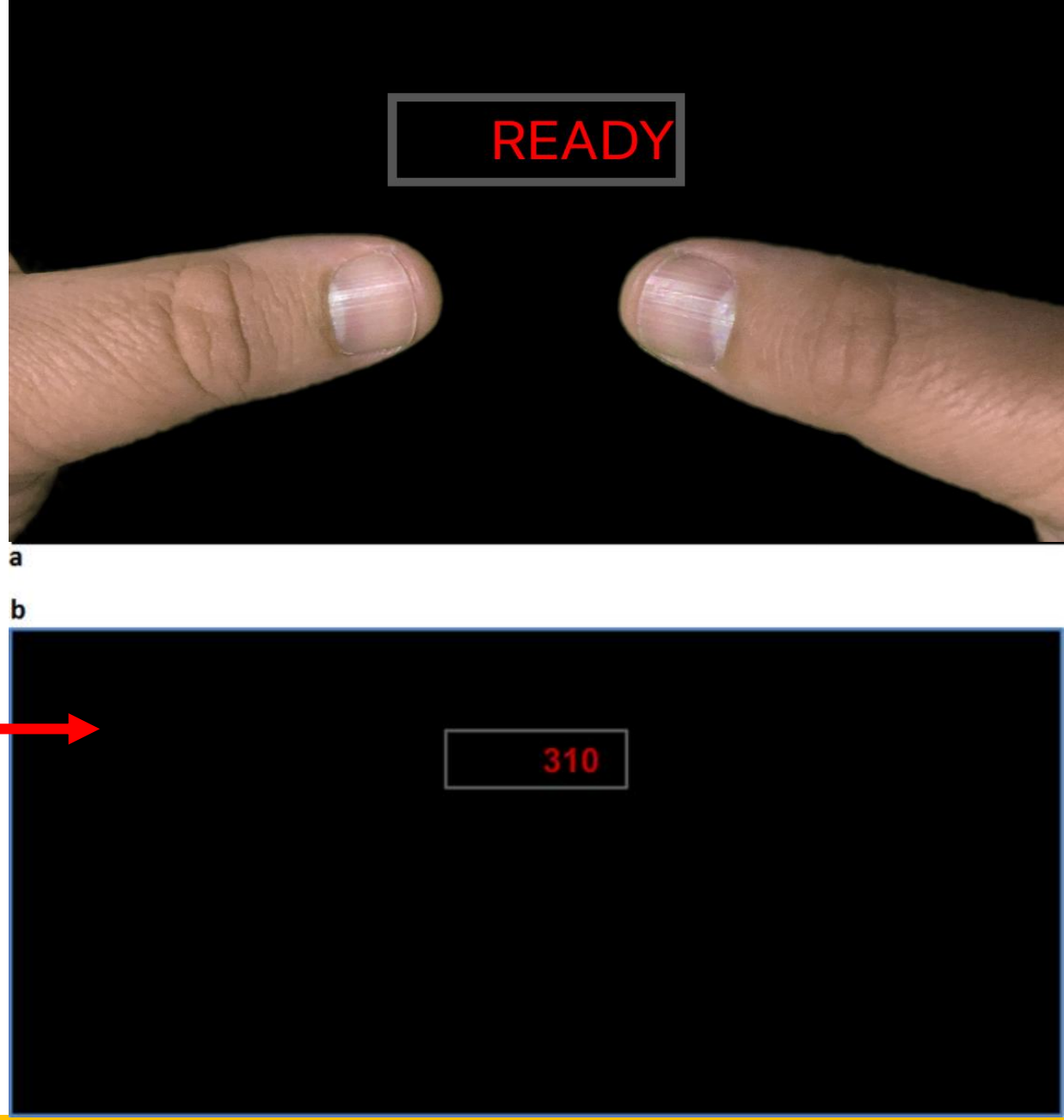
- Participants
  - Representative of population
  - Training session
- Experimental Design
  - Identical or balanced schedules
  - Include baseline or control
- Suggested scripts

Photo Examples



Figures from Arsintescu et al., 2019





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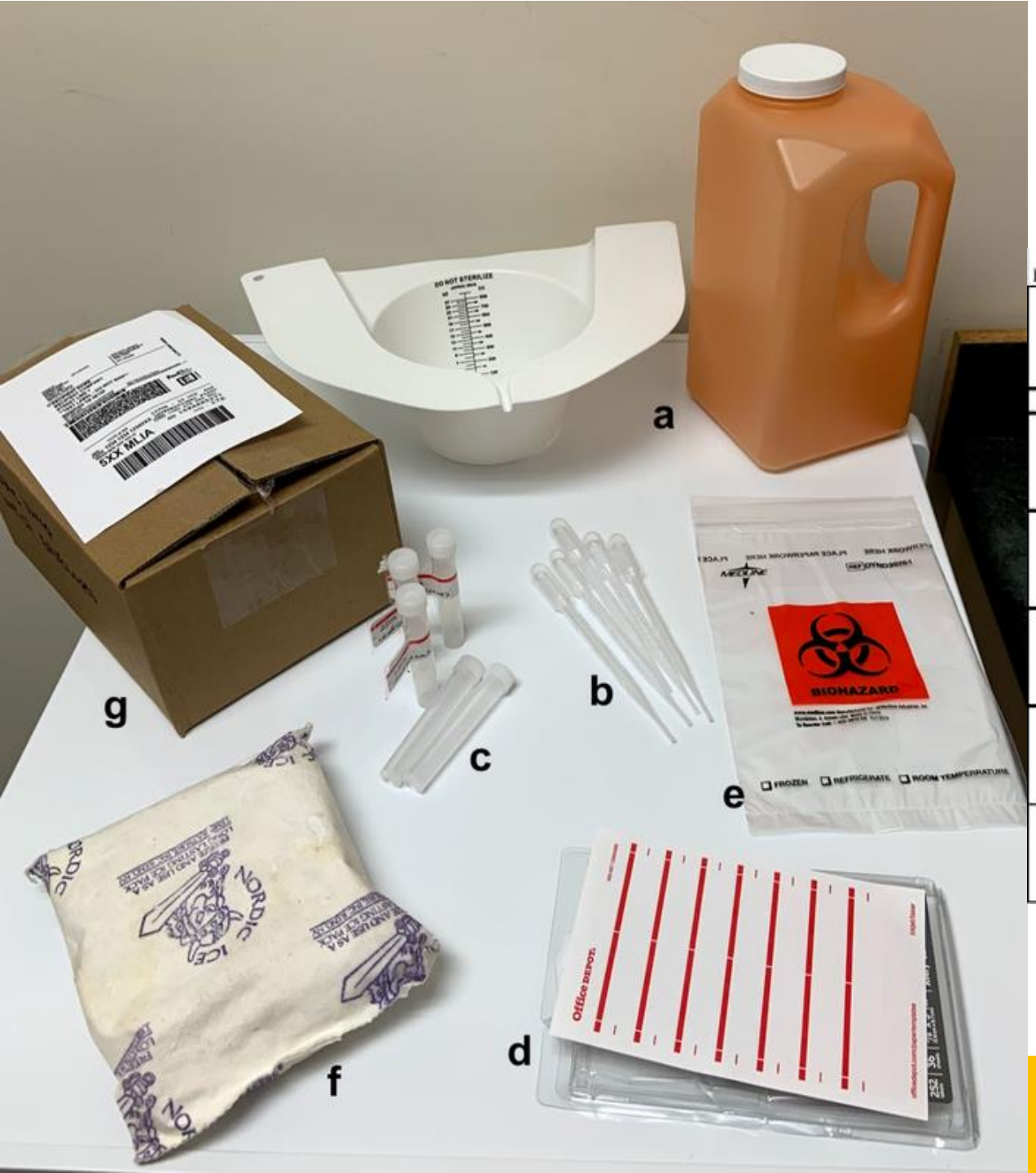
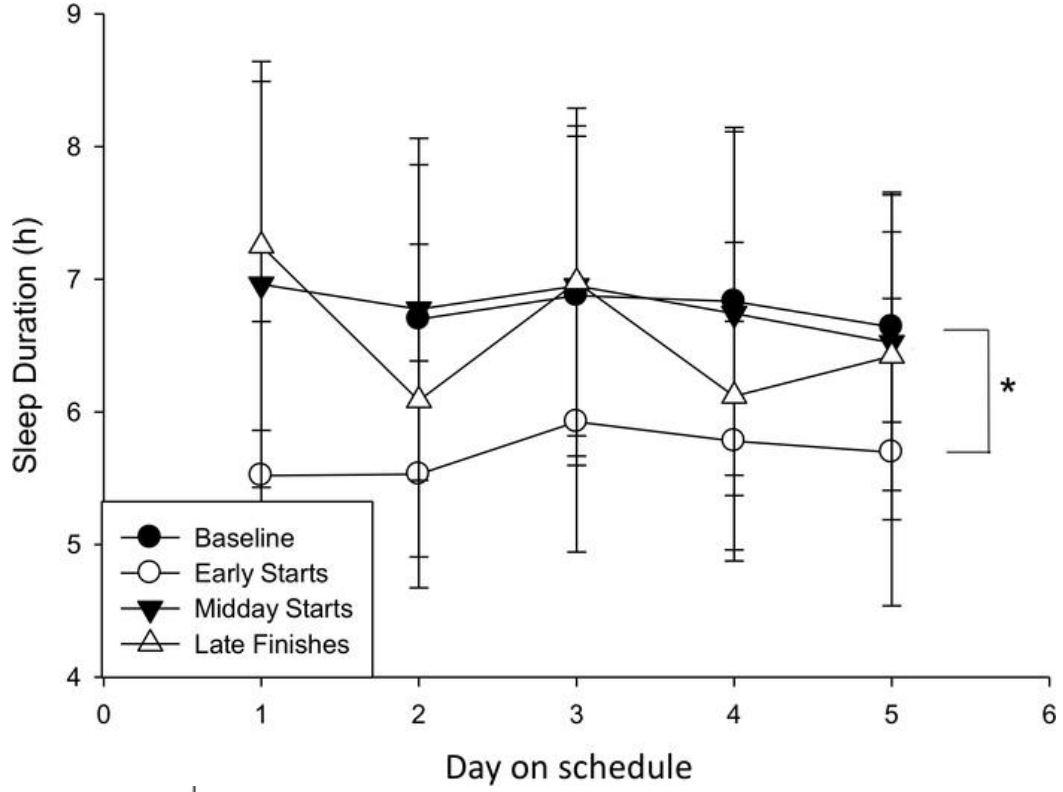


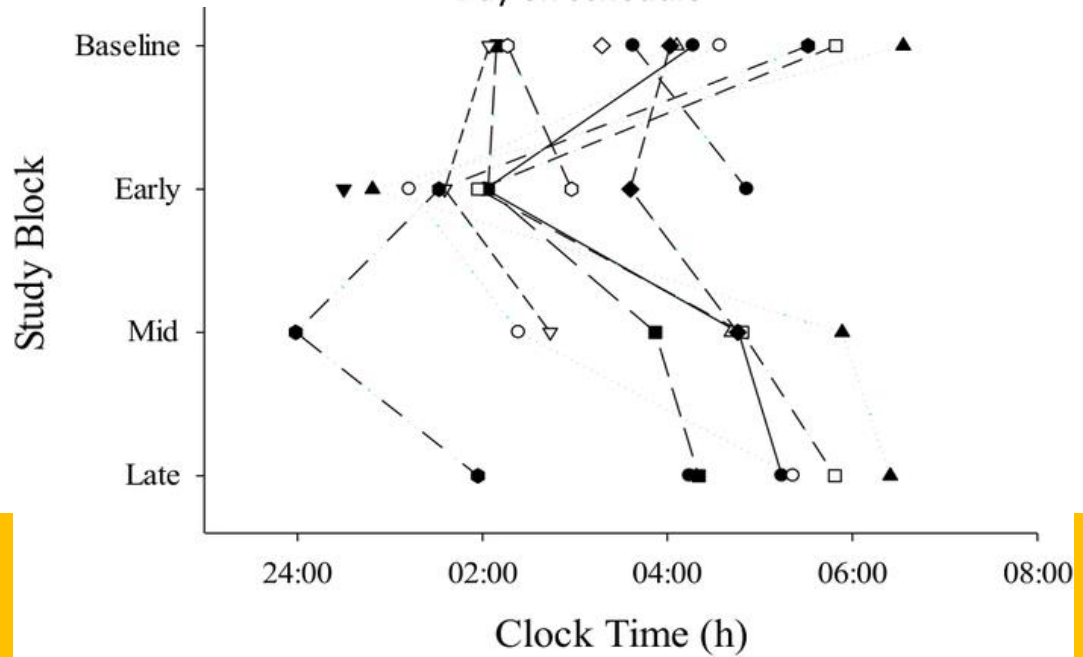
EXAMPLE Urine Collection Log Sheet

Date (dd/mm/yy)	Collection Block	Clock Time of Collection Block	Clock Time When Your Urinated	Total Urine Volume (ml)	Clock Time Sample Taken From Collection Container, Added to Sample Tube	Sample tube #
Please do not collect your first void when you wake on the first day. Urinate in the toilet and begin collection the next time you						
09/15/2019	#1	Start: 0700 End: 1100	0745 1050	550	1055	21501
09/15/2019	#2	Start: 1100 End: 1500	1230 1330 1455	600	1500	21502
09/15/2019	#3	Start: 1500 End: 1900	1855	400	1900	21503
09/15/2019	#4	Start: 1900 End: 2300	2115 2300	500	2305	21504
09/16/2019	#5	Start: 2300 End: 0700	0300 0700	850	705	21505

Figures from Arsintescu et al., 2019



aMt6 Acrophase



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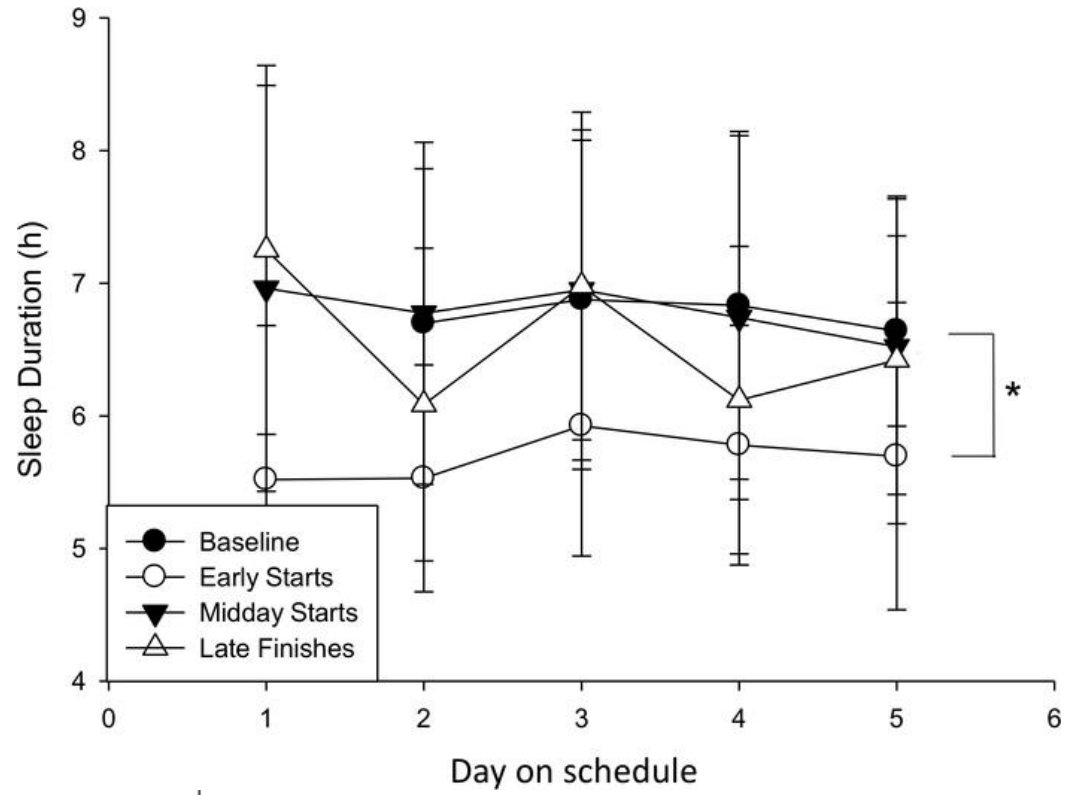

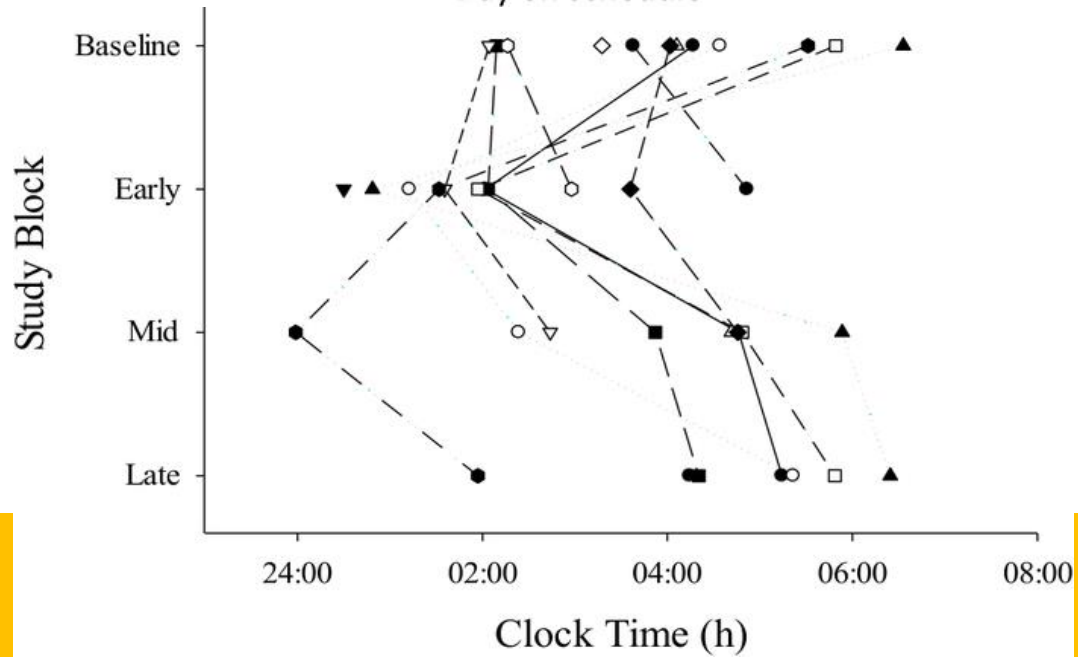

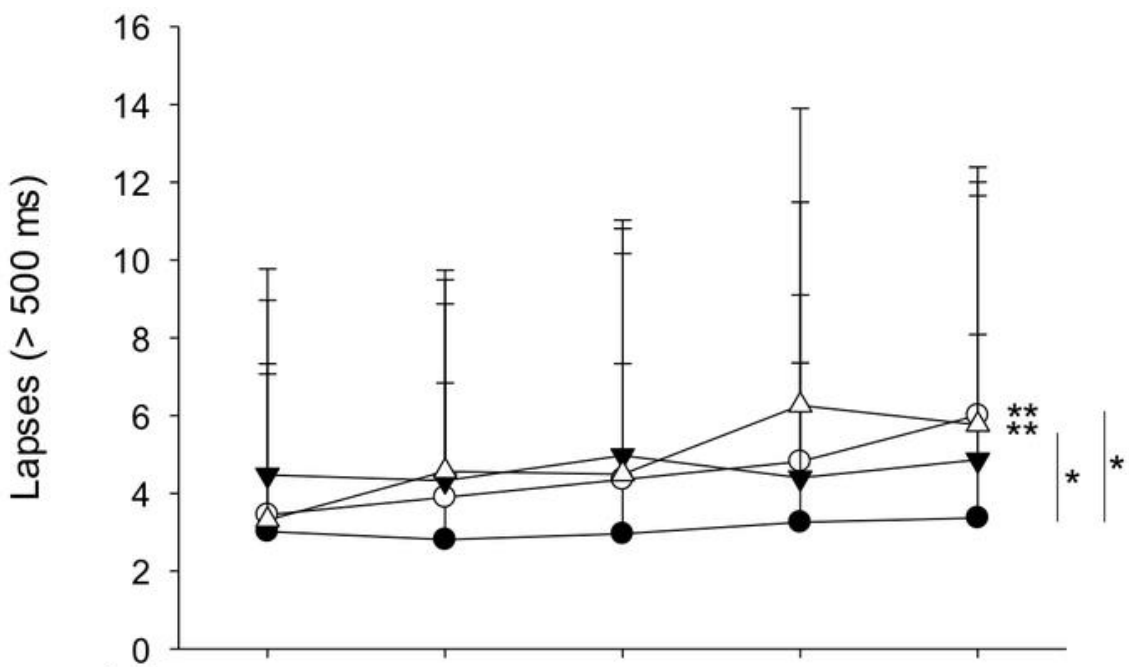

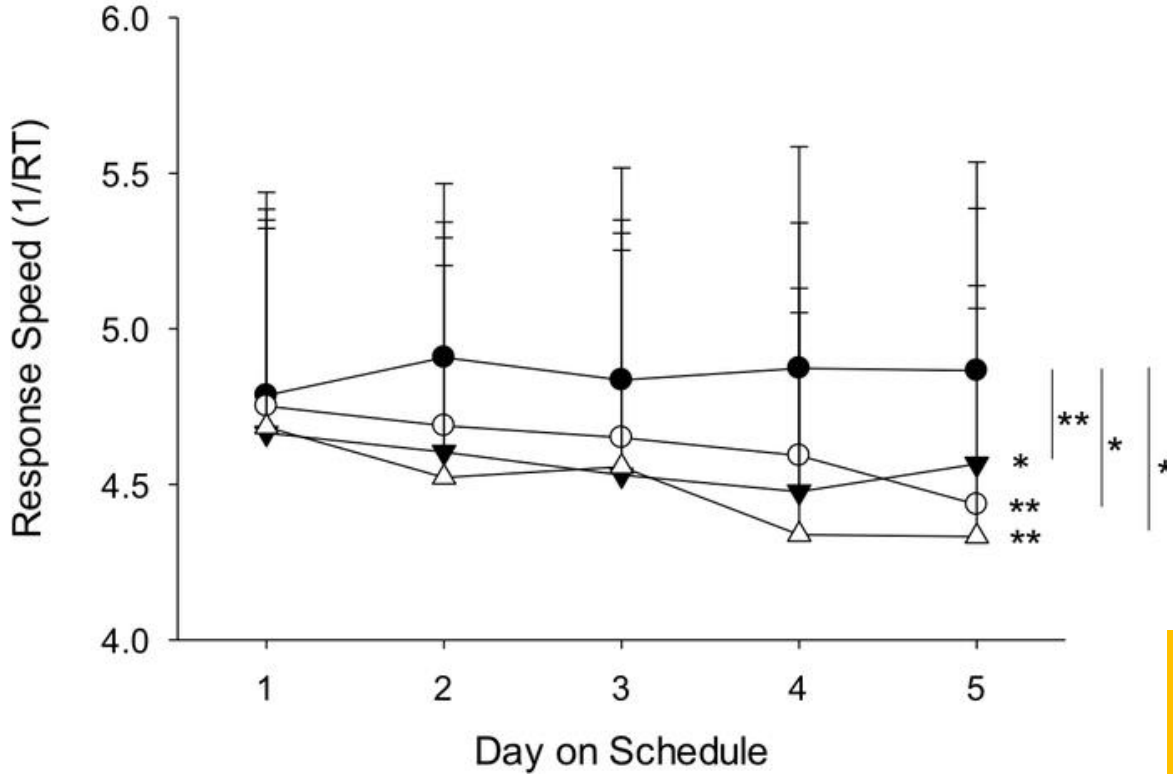

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Video

- https://www.jove.com/video/59851/collecting-sleep-circadian-fatigue-performance-data-complex

Highlights

- Important to train participants on all procedures and equipment; follow-up during data collection
- Combination of actigraphy, sleep diaries, urine collection, fatigue ratings, and PVT provides adequate data for evaluating the effectiveness of interventions, comparing duties, etc.
- Methods have translational potential for other complex operational environments
- Visual aids allow for deep dive into the specifics of data collection

Thank you