# Using daylong recordings to characterize sleep and speech activities in three subsistence populations

P1-D-50

C. Scaff[1]; K. Casey[2]; M. Mohammed-Norgan[2]; A. Guillu[2]; E. Hsieh[2]; H. Bo[2] & M. Casillas[2]

1. Institute of evolutionary medicine, University of Zurich / LSCP, CNRS, PSL University
2. Comparative Human Development, University of Chicago

## Introduction

How do infants attend to surrounding speech and how do they process linguistic information during the day?

To fully understand, it is necessary to incorporate the sleep/wake dynamics during development.

To date :

⚠ Little research linking the sleep/wake episodes to Language Acquisition.

⚠ Extremely little research from **non-WEIRD settings**, where sleep is mostly unscheduled[1,2] and children hear infrequent direct speech[3,4,5].

### Proof of concept study

Investigate 0 to 6-month-old infants' sleep/wake episodes using **daylong recordings** from 3 subsistence-scale communities.

We characterize:

- The frequency, duration, and distribution of sleep bouts.
- The language-related activities preceding and following sleep bouts.

### Predictions

- Daytime sleep patterns will gradually change during development[6]:

- From shorter to longer sleep bouts.
- From more cyclic/periodic bouts to more bursty ones.

- In the short time window preceding sleep, infants will experience talk from others at a higher rate than their average across the day.

- No differences between subsistence community.

## Methods

### How to use daylong recordings to determine sleep bouts?

1.LListen to ALL the daylong recording.
2. Determine the activity of interest*.
3. Manually mark the start time and end of the activity.

Activities of interest (in order of priority)

(1) Sleeping
(2) Silent but within earshot of others' talk
(3) Vocalizing with other
(4) Vocalizing alone
(5) Other activity (e.g., crying, feeding)
(6) Unsure

⚠*Activities are mutually exclusive.

### Recordings info

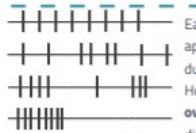
- One daytime recording/child
- Start time: early morning
- Mean duration: 8.9hrs
- Range: 6.4 - 17.4hrs
- Total: 107.3hrs

### Participants

- Mean age 3.3 mo [range : 0-6]
- Tseltal Mayan (N=4)
- Rossel Island Papuan (N=7)
- Tsimane' (N=1)*includes nightime

### Burstiness[7]

A measure that accounts for the **distributional properties** of a given burst (here activity of interest). Its calculation relies mainly on **the time separating** the event with its **repetition**.




Each vertical bar represents the appearance of the activity of interest during the recording. Here, they share the **same frequency overall** but we can see very different distributions over the same time period.

## Results

Infants spent on average **40.8%** of the recording sleeping (range: 18.4-60.2%).

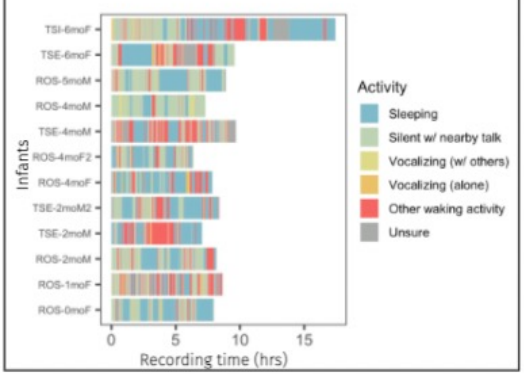
We detected on average **10 sleep bouts** per infant (range: 3–20).

The **duration** of sleep bouts did not have a clear development trend.

**Increasing burstiness** with age $r$≈0.52 [-0.45, 0.67], but the change was subtle.

In the 10 minutes preceding sleep, **infants hear more talk** in comparison to the 10 minutes following sleep.
The amount of hearable speech preceding sleep was **comparable** to the average amount across the whole recording.

Figure 1. Distribution of activity bouts over the recorded day. TSI = Tsimane', TSE = Tseltal, ROS = Rossel Islander. 3moF = 3 month old female.




## Discussion/Conclusions

- Substantial **inter-individual variability** in daytime sleep patterns.
- **No evidence** for more talk around children preceding sleep.
- This annotation task is **arduous** and the data are still undergoing quality checks, so the results are **preliminary**.
- **Promising** use of daylong recordings for this line of research.
- We acknowledge the **limitations** of using audio recordings to identify sleep bouts (i.e., combination of automated audio analysis + an accelerometer would be ideal).

### Acknowledgements

This work was possible thanks to a fantastic group of research assistants who went into the impossible task of coding this data. We thank all the Tseltal, Rossel Islanders and Tsimane' families who participated in the recordings.

### References

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