

Sleep composition analysis documentation

Output tables are separated based on whether the post-trial 5 recordings were segmented into four parts or not. The folder *whole_posttrial5* contains results from a whole post-trial 5 recording, and *segmented_posttrial5* contains post-trial 5 recordings partitioned into 4 parts.

phasic_tonic_per_rem_epochs contains total durations, numbers of phasic/tonic epochs per REM epoch.

phasic_tonic_per_rem_trial contains total durations, numbers of phasic/tonic epochs per post-trial.

sleep_states_per_trial contains total durations, number of bouts and normalized durations.

The total sleep is the sum of NREM, Intermediate and REM states.

$total_trial_time = total_awake_duration + total_sleep_duration.$

$wake_normalized = total_awake_duration / total_trial_time$

$nrem_normalized = total_nrem_duration / total_trial_time$

$rem_normalized = total_rem_duration / total_trial_time$

$nrem_percentage = total_nrem_duration / total_sleep_duration$

$rem_percentage = total_rem_duration / total_sleep_duration$

phasic_tonic_strings_window contains *event_strings* of each REM epoch in the recordings. REM epochs are identified by *rem_start* and *rem_end* columns. The column *event_strings* contain phasic and tonic states classified by 1 second window. The classification algorithm works as follows:

1. Create a numpy array of 0s:

```
result = np.zeros(rem_end-rem_start, dtype=np.int8)
```

2. Round up the phasic REM timestamps if the fractional part is greater than 0.5. For example, if we have a phasic period between 3.4s and 5.2s. The window between 3s and

4s is “P” because it contains 60% phasic state, while the 5s to 6s window is classified as “T” since it contains 20% phasic state.

3. Fill the phasic intervals as 1.

phasic_tonic_strings_epoch contains *event_strings* classified based on epochs instead of 1 second windows. The computation is more straightforward. The phasic REM states are classified as “P” regardless of the duration. If there were 3 phasic epochs detected in a REM, the resulting *event_string* “TPTPTPT”, assuming the REM period doesn’t start or end with a phasic state.