

Introduction: It is well established that human perception relies on top-down representations, such as expectations. The extent to which such representations influence the processing of upcoming stimuli in sleep has been only recently investigated. Some studies report disruption of hierarchical predictive coding in sleep, whereas others argue for limited but preserved detection of violation of predictions, with profound implications to studies showing effective learning during sleep. Here, we present preliminary results of how higher-order stimulus statistics modulate the neural responses during sleep.

Materials and Methods: We presented participants (N=24) with four different auditory tones presented at a fixed presentation rate (3 Hz). We manipulated the tone transition probabilities creating random and predictable tone sequences. Participants listened to the tones in wakefulness and during a 2.5 hour afternoon nap. We collected simultaneous Electroencephalography (EEG) and Magnetoencephalography (MEG) data. We used the EEG data for sleep staging, and we analyzed the MEG data using multi-level pattern analysis (MVPA) to decode low-level tone properties.

Results: Preliminary results indicate that low-level stimulus properties are decodable in N1 and N2, although decoding accuracies drop significantly. This is in line with previous studies showing attenuated cortical activations related to the processing of low-level stimulus properties in sleep. In addition, decoding of ordered tones yield significant and above chance pre-stimulus decoding accuracies, whereas this was not observed for the random tones. This effect was present also in N1 and N2 but decoding accuracies appeared less pronounced and stable than in wakefulness.

Conclusions: Detection of stimulus predictability seems to be preserved, at least to some extent, in sleep.

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PULSE RATE VARIABILITY PREDICTS DEMENTIA IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Objective: We have shown in previous studies that indices of pulse rate variability (PRV) are associated with the incidence of atrial fibrillation (AF) and the occurrence of stroke in patients with obstructive sleep apnea patients (OSA). Given the strong associations between AF, stroke, and dementia, we evaluated in these patients whether PRV indices are also associated with the risk of dementia.

Patients and methods: This retrospective study was conducted on OSA patients from the French Pays de la Loire sleep cohort database. Clinical and sleep recording data from 3283 patients aged 60 years and older, without a history of AF were merged with health administrative data to identify the occurrence of dementia (Alzheimer’s or other). Time and frequency-domain parameters of PRV were extracted from photoplethysmography signals. Cox proportional hazard models were used to assess the association between PRV parameters and dementia risk. Association of dementia with clinical parameters as well as OSA severity indices was also assessed.

Results: After a median follow-up of 6.8 years, 70 patients had been diagnosed with dementia. Incident dementia was independently associated ($p < 0.05$) with older age, depression, stroke, hypertension, and temporal and frequency indices of PRV. In multivariate analysis only age, depression, and 2 temporal indices of PRV (ln RMSSD: HR [95%CI] = 1.36 [1.08-1.71] and ln SNND: HR [95%CI] = 1.34 [1.05-1.72]) were associated with risk of dementia. However, there was no association between OSA severity indices and dementia.

Conclusion: In patients with OSA, older age, depression and increased pulse rate variability assessed by sleep oximetry derived RMSSD and SNND indices may help identify patients at high risk for dementia.

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QUANTITATIVE AND QUALITATIVE FEATURES OF DREAMING ACTIVITY DURING THE PANDEMIC

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Introduction: The COVID-19 pandemic has crucially influenced daily habits, mental health, and sleep. Several findings reveal that dreams are affected by waking experiences and sleep patterns. The lockdown could have provoked strong modifications in dreaming activity. This study aimed to assess dream features during the Italian lockdown. Furthermore, we also investigated the impact of the end of COVID-19 confinement on dream activity through a longitudinal investigation.

Materials and Methods: We used a web survey to collect demographic, clinical, sleep, and dream data during the lockdown. The sample included 1091 participants. After filling out the survey, 90 subjects participated in the longitudinal protocol lasting two weeks: (a) the first week (April 28–May 4) of full lockdown; and (b) the second week (May 5–May 11) of easing of restrictions. Participants were asked to record at home their dream experiences and complete a sleep-dream diary each morning.

Results: Results obtained from the first protocol showed an increase in quantitative and qualitative dream features during the lockdown, compared to a pre-lockdown period. Higher dream frequency and specific qualitative features were found in females and individuals with poor sleep quality, nocturnal disruptive behaviors, and depressive symptoms. Most of the dream features collected during the lockdown were predicted by age, gender, depressive symptoms, presence of other people at home, and territorial area. Sleep duration and several sleep quality indexes were the best predictors of dream variables. During the lockdown, dreams were also characterized by increased negative emotions, particularly frequent in females, younger adults, and people with poor sleep quality, nocturnal disruptive behaviors, anxiety, and depressive symptoms. Regarding the longitudinal protocol, the analyses showed that participants had higher numbers of awakenings, lower ease of falling asleep, higher dream recall, and lucid dream frequency during lockdown than post-lockdown. Subjects reported more dreams, including “being in crowded places” during post-lockdown than lockdown.

Conclusions: Our results confirm the strong influence of the pandemic on dreaming, supporting both the continuity-hypothesis between waking experience and sleep mentation and the view of a key influence of sleep patterns on dreaming. The poorer sleep quality during lockdown is consistent with previous studies. The relationship between traumatic events and dream recall frequency supports the idea of the pandemic as “collective trauma”. Moreover, we hypothesized that the greater lucid dreams frequency during confinement could reflect the attempt to cope with the waking pandemic experiences. The crowded places into dream scenarios during the second week of our protocol are also consistent with the continuity-hypothesis: the possibility to access places frequented by other people could represent a relevant experience after a long period of confinement. Finally, we believe that investigations on COVID-19 infected subjects experiencing the long-COVID-19 syndrome should be carried out since preliminary findings on COVID-19 patients showed strong associations between increased nightmares and the infection severity. This evidence suggests that the more that people were affected by COVID-19, the greater the impact on dream activity and quality of life.

RELATIONSHIP BETWEEN OBJECTIVE SLEEP QUALITY AND AGGRESSIVENESS

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Introduction: Sleep is linked to different emotions and behaviors, but despite this, studies relating sleep quality or sleep problems with