

## Individual factors associated with dream recall and content: exploiting Somnieve, an extensive multimodal dream database

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**Background:** The study of dreams represents a crucial intersection between philosophical, psychological, neuroscientific, and clinical interests. Given the high cost of sleep and dream research in terms of human effort and funding, open science will constitute a key for significant advances in the field. Based on these premises, we created Somnieve, a multimodal, open-source database collecting dream reports along with demographic information and psychometric, cognitive, and electroencephalographic measures obtained from a representative sample of the healthy Italian adult population. Here we used Somnieve to investigate the individual determinants of physiological dream content and recall frequency (DRF).

**Methods:** Somnieve currently includes 1324 dream reports obtained from 161 subjects (66M, 18-65y). Participants were asked to wear an actigraph and to record a report of their last dream experience each morning upon awakening for 14 days. Moreover, they completed a battery of questionnaires and cognitive tests. A multiple regression analysis was used to investigate the individual determinants of DRF. To quantify and analyze dream content, we trained an LSTM recurrent neural network on a subset of dreams (n=823), which were scored by 4 raters on 15 semantic dimensions of interest. A cluster analysis was then performed on the whole database and correlations between dream features and individual factors were explored.

**Results:** DRF was predicted by age, attitude toward dreaming, interference control, verbal memory, and mind wandering ( $p < 0.05$ , FDR corrected). However, the effect of age was largely explained by changes in sleep-wake patterns as measured by actigraphy. The analysis of dream content allowed us to map the relationships between the selected semantic features but did not reveal any clear dream clusterization: dream features appeared to change along a continuum only partially explained by word count. None of the considered individual factors appeared to predict dream content ( $p < 0.05$ , FDR corrected). However, a trend correlation was observed between trait anxiety and dream emotional valence ( $p < 0.001$ ).

### Conclusions:

Open, multimodal databases like Somnieve will be crucial to improve reproducibility in dream research and thus identify the individual determinants of dream content and DRF in physiological conditions, as well as quantify their possible pathological alterations.