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## **NREM parasomnia as a dream enacting behavior**

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## **1. Introduction**

In contrast to REM sleep behavior disorder, NREM parasomnias have often been considered as non-dreaming states, as they emerge from N3 sleep (a sleep stage with minimal dream recall), and are frequently amnesic, especially in children [1]. However, recent studies challenge this view, as up to 80% of adult patients with sleepwalking/sleep terrors occasionally remember a short dreamlike mentation associated with the parasomniac episode [2-4]: mostly an unpleasant visual scene containing immediate danger, associated with apprehension and projected in the bedroom setting [5]. However, direct evidences of isomorphism between behaviors and dreamlike mentation are exceptional. Plus, little is known about the overt presence of content from daily experiences in N3 dreams.

## **2. Case report**

A 37 year-old woman, trainer in activity, who practiced sailing as a hobby, was referred for agitated nightmares. After falling at 3 months of age, she had a skull fracture, secondary meningitis and coma. Nevertheless, she presented a normal development. She described nightmares since childhood, containing hospital lights and smells, which disappeared during adolescence. At age 17 years-old, she started to leave her bed during the night, with amnesia of the behavior. She once opened the bedroom window and was awakened by the cold air. Her husband reported that she frequently sat on her bed and sleep talked. She did not take any drug or substance. She benefit from a video-polysomnography on two successive nights. The 13 sudden awakenings from N3 sleep included sleep talking (mumbles or "What, what is it ? Why are you making this face ? What ? Ah !"; "I sleep like a baby"; "Oh damn, it's crazy !"), gestures and surprised face. In one of the N3 interruptions (Video-clip

#1) she opened the eyes, saying “Slowly!”, then screamed while protecting her head and throwing herself to the right side. She then slowly raised her head again (still holding her protected), looking up and down cautiously, while saying “Oh damned, what is it? Oh boy !”, looking up, down and around. Motor activity, rapid eye movements, EEG slow waves of reduced amplitude and tachycardia were observed in the concomitant recording (Figure). The nurse entered the room 26 sec after the beginning of the parasomniac event, and the patient immediately reported: “I don’t know what I’ve done. It’s super bizarre. That’s scaring. It is super-hot here (showing her chest, saying it was painful). It was a nightmare.” She later reported to the nurse that she was dreaming to be on a boat sailing with the wind astern, and that the boom was slowly moving and suddenly gybed, which was about to smash her head (as illustrated in Video-clip #2). There was a normal muscle atonia and no movements during REM sleep, and no EEG epileptiform waves. The patient was successfully treated with carbamazepine 200 mg taken 1 h before bedtime and hypnosis.

### **3. Discussion**

The patient had obviously sleep terrors and somnambulism, thanks to her medical history and the observation of confusional arousals, sleep talking and complex non stereotyped behaviors emerging from N3 sleep. REM sleep behavior disorder and post-traumatic stress disorder (which are associated with dream-enacting behaviors), as well as epilepsy were ruled out (Table). This case illustrates a brief, scenic behavior, which includes surprise, head protection, examination of the bedroom and semi-rapid recover of consciousness, followed by the report of a nightmare (a gybing boom, which is an imminent threat) congruent with the behavior observed before the full awakening, followed by a prolonged feeling of painful heat. She dreamt of normal sailing, a condition that she experienced several times in real life

before, suggesting some incorporation of episodic memory. In contrast, many adult sleepwalkers rather report being buried alive, facing a collapsing roof or a tsunami, or seeing snakes in the bed (conditions that they never experienced before), which do not suggest incorporation of episodic memory [2]. Here, the dream-behavior isomorphism is a direct evidence that NREM parasomnias can be dream-enacting behaviors. A similar case has been previously displayed [6]: a patient sleeping in N3 sleep suddenly stood up on the bed and raised his right arm. He later remembered dreaming that the roof was collapsing and he was trying to hold it up. Such dream-enacting behaviors followed by congruent dream recall are exceptionally monitored in the sleep laboratory, but more frequently reported at home [7, 8], where they usually last longer. They are precious illustrations indicating that not only REM sleep behavior disorder, but also NREM parasomnias can be dream-enacting behaviors.

## References

1. Arnulf I. Sleepwalking. *Curr Biol* 2018; 28: R1288-9.
2. Oudiette D, Leu S, Pottier M, Buzare MA, Brion A, and Arnulf I. Dreamlike mentations during sleepwalking and sleep terrors in adults. *Sleep* 2009; 32: 1621-7.
3. Haridi M, Weyn Banningh S, Clé M, Leu-Semenescu S, Vidailhet M, and Arnulf I. Is there a common motor dysregulation in sleepwalking and REM sleep behaviour disorder? *J Sleep Res* 2017; 26: 614-22.
4. Zadra A, Desautels A, Petit D, and Montplaisir J. Somnambulism: clinical aspects and pathophysiological hypotheses. *Lancet Neurol* 2013; 12: 285-94.

5. Uguccioni G, Golmard JL, de Fontreaux A, Leu-Semenescu S, Brion A, and Arnulf I. Fight or flight? Dream content during sleepwalking/sleep terrors vs rapid eye movement sleep behavior disorder. *Sleep medicine* 2013; 14: 391-8.
6. Bhat S, Chokroverty S, Kabak B, Yang Q, and Rosen D. Dream-enacting behavior in non-rapid eye movement sleep. *Sleep medicine* 2012; 13: 445-6.
7. Pillmann F. Complex dream-enacting behavior in sleepwalking. *Psychosom Med* 2009; 71: 231-4.
8. Mwenge B, Brion A, Uguccioni G, and Arnulf I. Sleepwalking: long-term home video monitoring *Sleep medicine* 2013; 14: 1226-8.
9. Mysliwiec V, Brock MS, Creamer JL, O'Reilly BM, Germain A, and Roth BJ. Trauma associated sleep disorder: A parasomnia induced by trauma. *Sleep Med Rev* 2018; 37: 94-104.
10. Derry CP. The sleep manifestations of frontal lobe epilepsy. *Curr Neurol Neurosci Rep* 2011; 11: 218-26.

**Table – Frequency and characteristics of dream-enacted behaviors in the context of NREM**

**parasomnia, REM sleep behavior disorder, post-traumatic stress disorder and sleep-related frontal lobe epilepsy**

<b>Disorder</b>	<b>NREM N3 parasomnia</b>	<b>RBD</b>	<b>Acute PTSD [9]</b>	<b>Sleep-related frontal lobe epilepsy [10]</b>
Sleep stage	N3	R	N2, R	N1, N2
<i>Behaviors during the episode</i>				
Eyes	Open	Closed	Open	Open
Ambulation	Frequent	Exceptional	Rarely jumping out of bed and walking	Rare running and nocturnal wandering
Interaction with environment	Frequent	Less frequent	Frequent	Frequent
Movements	Similar to wake movements: confusional arousals with orientation behavior or complex, purposeful, prolonged behaviors	Various, varying from jerky simple movements to complex, usually brief purposeful behavior. Absent tremor and absent bradykinesia	Frequent, explosive, violent movements; thrashing, shaking, startling	Stereotyped paroxysmal arousals, tonic posturing, focal clonic activity, gestures, semi-purposeful automatisms; bicycling, hand rubbing
Vocalizations	Moaning, sentences, swearing  Interrogative tone	Moaning, sentences, insults  Imperative tone	Frequent vocalizations, grunting, yelling, screaming	Moaning, palilalic speech comprehensible words

*Subjective experiences and dreams associated with the behavior*

Recall of associated mentation	Infrequent recall (occasional in 70%)	Frequent recall	Frequent recall (but startling may occur in absence of dream recall except fear)	Frequent recall of the seizure, but no associated dreams
Complexity	Brief visual scenes	More complex dreams and nightmares	Complex nightmare	No dreams
Content	Misfortune or aggression	Threat or aggression, rarely related to personal history	Replays of prior combat or traumatic experiences	No dreams
Response of the dreamer	Tends to flee from danger, rarely attacks the bed partner	Tends to fight back, may attack the bed partner	Defensive or offensive behaviors, may attack the bed partner	No dreams
Emotions	Frequently fear, apprehension	More variable, can laugh too	Intense fear	Possible fear

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NREM : non rapid eye movement sleep; PTSD: post-traumatic stress disorder; RBD: Rapid eye movement sleep behavior disorder.



### **Legend of the figure:**

**Figure:** 30-sec epoch of the videopolysomnography during the NREM parasomniac episode, illustrating the dissociated sleep-wake state. The EEG (Fp1/A2, C3/A2 and C3/O1) shows diffuse slow waves before the motor activity (N3 stage), then a muscle artefact during 5 sec, followed by slow waves of small amplitude in the frontal leads, and theta and alpha mixed waves in the central and occipital leads. There are eye movements (EOG 1 and EOG2, in pink color) after the beginning of the behavior, and muscle tone on the mentalis (EMG1) and right and left tibialis anterior (EMG2 and EMG3, in green color), plus a tachycardia (black numbers on the bottom), with heart rate raising from 73-75 bpm before the parasomnia to 108-113 bpm after it started. The red vertical line indicates the time of the picture shown in the left upper corner. The full parasomniac episode lasted around 25 sec.

### **Legend of the video-clip #1:**

Time is 11 PM, one hour after the patient fell asleep. She is in N3 stage at the beginning of the video-clip, then she opens her eyes, saying “slowly, slowly, slowly !”. Then she screamed (two brief acute screams) while protecting her head with her hands and throwing herself to her side, as if ducking to avoid something dangerous. She says “is it OK ?” then slowly raised her head (still cautiously holding her protected), and looked up and down several time cautiously, while saying “Oh damned, what is it? Oh boy! What is it? Oh boy !”, looking back, up and then around. The nurse entered the room 26 sec after the beginning of the parasomniac event, and the patient immediately reported: “I don’t know what I’ve done. It’s super bizarre. That’s scaring. I had the feeling of... I don’t know how it is. I feel hot here (she

showed her chest, and then her left leg, saying it was painful). The doctor says that it is some dreams, but there it was a nightmare.” She later reported to the nurse that she was dreaming to be on a boat sailing with the wind astern, and that the boom was slowly moving and suddenly gybed, threatening to smash her head.

**Legend of the video-clip #2:** An animator placed a fictive boom moving above the patient’s bed to illustrate the content of the dream.

The patient gave her written consent for the video to be displayed in a medical journal.



