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Autobiographical memory sources of threats in dreams

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ABSTRACT

Temporal sources of dream threats were examined through the paradigm of the Threat Simulation Theory. Two groups of young adults (18–24 years old), who did not experience severe threatening events in the year preceding their dream and reported a dream either with or without threats, were included. Participants (N = 119) kept a log of daily activities and a dream diary, indicating whether dream components referred to past experiences. The occurrence of oneiric threats correlated with the reporting of threats in the daily logs, their average severity, and the stress level experienced the day preceding the dream. The group whose dreams contained threats had significantly more references to temporal categories beyond one year than the group with dreams without threats. Our findings suggest that in the absence of recent highly negative emotional experiences, the threat simulation system selects memory traces of threatening events experienced in the past.

1. Introduction

Several theories have attempted to explain the function of dreaming. These possible functions range from facilitating emotional adaptation (Kramer, 1993) and consolidating memory (Payne & Nadel, 2004; Scrima, 2011) to integrating and mastering life experiences (Wright & Koulack, 1987). From other perspectives, dreams generate creative solutions to personal problems (Cartwright & Lamberg, 1992), or allow for the creation of new associations between ongoing cognitive processes and the information encoded into one's memory (Stickgold, Scott, Rittenhouse, & Hobson, 1999). More recently, it was proposed that dreaming may play a role in learning, memory, and emotion regulation processes (Perogamvros & Schwartz, 2012), or that dreams allow to functionally practice social skills (Revonsuo, Tuominen, & Valli, 2015). Dreaming could also reflect the fragmentation of autobiographical memories that are then re-bound with other memory sources through a hyperassociative process, leading to the de-contextualization of experiences, and the ulterior increased accessibility of relevant memory fragments (Horton & Malinowski, 2015). Finally, the Threat Simulation Theory (TST) proposes that dreaming, as a cognitive function, had in prehistoric times a survival value, as it increased threat-avoidance skills, thereby improving the odds of successful reproduction (Revonsuo, 2000a). The objective of the current study is to test predictions derived from this last model, within a modern context.

1.1. Threat simulation theory

According to Revonsuo (2000a), Revonsuo (2000b), who originally defined the TST, it is important to take into account the environment in which this survival function has evolved. This environment is the Paleolithic era, during which our human ancestors

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lived for hundreds of thousands of years (Revonsuo, 2000a). In those days, dreaming would have evolved as a simulation system producing a simulacrum of the world perceived during wakefulness (Revonsuo, 1995). The TST thus postulates that the function of the virtual reality of dreams is to produce a simulation of threatening events, the sources of which are derived from situations experienced while awake and associated with a strong negative emotional charge (Revonsuo, 2000a; Valli & Revonsuo, 2009). When prehistorical people were confronted by a severely threatening event in their daily life, it is likely that the threat simulation system (TSS) selected the mnesic trace of this moment, repeatedly, so that their dreams would become a simulation of that threat. The virtual repetition of this event would help increase their capacity to cope with this type of threat. This would have been made possible through the repeated nocturnal activation of neurocognitive mechanisms necessary for recognizing and adapting behavior (Valli & Revonsuo, 2009). The biological function of dreams would, therefore, have been to simulate threats in a safe environment and to optimize survival skills in a context of omnipresent dangers, increasing the likelihood of reproduction (Revonsuo, 2000a). This biological feature of the function of dreams would consequently have been passed on from one generation to the next until today (Valli & Revonsuo, 2009).

Six propositions represent the basis of the TST (Revonsuo, 2000a; Valli & Revonsuo, 2009). Proposition 1 states that the dream experience is an organized and selective simulation of the real perceptual world. Proposition 2 states that the simulation of threatening situations is the specialization of dream consciousness. Proposition 3 states that the experience of real threatening events triggers the activation of the TSS and the latter recourses to elements drawn from long-term autobiographical memory (LTAM). Proposition 4 states that the threat simulations generated by the fully activated system are perceptually and behaviorally realistic repetitions of threatening situations. Proposition 5 states that even if the oneiric simulations are not consciously recalled, their rehearsal leads to improved survival skills. Finally, Proposition 6 states that in the environment in which human beings lived for the major part of their evolutionary history, threatening situations, such as an attack from a wild animal or a rival tribe, were frequent occurrences. Consequently, the repetition of realistic threat simulations improved abilities to cope with threats, leading to an increase in reproductive success. As pointed out earlier, the TST does not claim that this adaptive function applies to our evolved society.

1.2. Testing the TST

Revonsuo and Valli (2000) developed the Dream Threat Scale (DTS). It is a multidimensional scale including eight categories: (1) the nature of threatening events; (2) their target; (3) their severity; (4) the participation of the dream self in the threatening events; (5) the reaction of the dream self; (6) the resolution of the threats; (7) the consequences of the threats to the self; and (8) the realism of the threats. Later, Zadra, Desjardins, and Marcotte (2006) modified the scale according to their own conceptualization of the theory. The theory was tested in numerous studies (Malcolm-Smith, Koopowitz, Pantelis, & Solms, 2012; Malcolm-Smith & Solms, 2004; Malcolm-Smith, Solms, Turnbull, & Tredoux, 2008a; Malcolm-Smith, Solms, Tredoux, & Turnbull, 2008b; Revonsuo & Valli, 2000; Valli and Revonsuo, 2006; Valli, Lenasdotter, MacGregor, & Revonsuo, 2007; Valli, Revonsuo, Palkas, & Punamaki, 2006; Valli, Revonsuo, Strandholm, & Sillanmaki, 2008; Valli et al., 2005; Zadra & Desjardins, 2006; Zadra et al., 2006). Findings are generally consistent with the theory's central propositions, despite some differences. The reported study focuses on the sources of oneiric threats, as proposed by the TST.

1.3. Mnesic and temporal sources of threats in dreams

The third proposition of the TST states that the experience of real threats triggers the activation of the TSS (Valli & Revonsuo, 2009). Support for this proposition stems from studies conducted by Valli et al. (2005), Valli, Revonsuo, Palkas, and Punamaki (2006) indicating that war-traumatized children had a more active TSS, and reported more threatening dreams with more severe menaces than did non-traumatized children. Clinical studies linking the experience of a traumatic event with nightmare disorders provide additional, although indirect, support for the proposition (Hartmann, 1998; Mellman & Hipolito, 2006; Mellman & Pigeon, 2005; Nader, 1996; Phelps, Forbes, & Creamer, 2008; Schreuder, Kleijn, & Rooijmans, 2000). Furthermore, studies discussing the induction of unusual pre-sleep stimulations show that such experiences do influence dream content. Indeed, the artificial induction of negative stimuli prior to sleep (Carpenter, 1988) and pre-sleep stressful experiences (De Koninck & Koulack, 1975; Koulack, Prévost, & De Koninck, 1985) tend to become represented in dream content the following night. Similarly, Bradshaw, Lafrenière, Amini, Lortie-Lussier, and De Koninck (2016) found a significant correlation between the presence of threats in the day log preceding remembered dreams and the presence of threats in the dream reports of the following night. More specifically, the severity of the most threatening event the day preceding the dream was significantly associated with the severity and frequency of dream threats the following night. The authors also found that the frequency of threats the day prior to a dream significantly correlates with the frequency of dream threats the following night. These findings suggest a close temporal relationship between the experience of threatening situations the day preceding the dream and the production of menacing dreams the subsequent night. However, the mnesic and temporal origins of oneiric threats remain to be determined.

In order to support the second part of their proposition, which states that the material used for threat simulations can also be drawn from LTAM, Valli et al. (2008) found that the type of threats represented in dreams was statistically similar to that of threats encountered in the past. These threats were reported during interviews with participants, who gave detailed accounts of all past threats they remembered having experienced. While minor threats were seldom remembered, severe ones were frequently reported. This suggests that mundane events would progressively decay over time in autobiographical memory, whereas the most threatening events would be overrepresented in this type of memory (Chapman & Underwood, 2000). Thus, Valli et al. (2008) concluded that in the absence of a severely threatening event in the recent past, the TSS will select memory traces containing the most prominently

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