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Short Communication

Approach/avoidance in dreams

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ABSTRACT

The influential threat simulation theory (TST) asserts that dreaming yields adaptive advantage by providing a virtual environment in which threat-avoidance may be safely rehearsed. We have previously found the incidence of biologically threatening dreams to be around 20%, with successful threat avoidance occurring in approximately one-fifth of such dreams. TST asserts that threat avoidance is over-represented relative to other possible dream contents. To begin assessing this issue, we contrasted the incidence of 'avoidance' dreams with that of their opposite: 'approach' dreams. Because TST states that the threat-avoidance function is only fully activated in ecologically valid (biologically threatening) contexts, we also performed this contrast for populations living in both high- and low-threat environments. We find that 'approach' dreams are significantly more prevalent across both contexts. We suggest these results are more consistent with the view that dreaming is generated by reward-seeking systems than by fear-conditioning systems, although reward-seeking is clearly not the only factor determining the content of dreams.

1. Introduction

The adaptive function of dreaming, if any exists, remains elusive. A recently influential hypothesis is the 'threat-simulation' theory of Revonsuo (2000). According to this theory, dreaming provides a virtual environment in which biologically threatening situations can be safely rehearsed: "the constant nocturnal rehearsing of threat perception and threat avoidance skills increased the probability of successful threat-avoidance in real situations and thus led to increased reproductive fitness" (Revonsuo, 2000, p. 898). This claim is consistent with the now well-established fact that the amygdala, a brain structure pivotally implicated in fear conditioning (Le Doux, 2002), is highly activated during REM sleep (Braun et al., 1997; Maquet et al., 1996; Nofzinger, Mintun, Wiseman, Kupfer, & Moore, 1997). Revonsuo argues that the amygdala is activated in dreams to evaluate hallucinated threats and assist in selecting the appropriate avoidance response (op cit, pp. 886–887, 894). However, as Revonsuo acknowledges, the amygdala is not the only instinctual-emotion circuit that is highly activated during dreaming sleep; in fact the entire limbic system is activated (Braun et al., 1997; Maquet et al., 1996; Nofzinger et al., 1997).

Despite the fact that research (reviewed by Revonsuo (2000)) indicates that dream content is often negative, and that traumatic events impact on dream content, the focus on fear-conditioning in threat simulation theory (TST) has raised questions, particularly in light of low rates of real physical threat in dreams, and even lower rates of successful avoidance of such threats (e.g. Malcolm-Smith & Solms, 2004; Malcolm-Smith, Solms, Turnbull, & Tredoux, 2008a; Zadra, Desjardins, & Marcotte, 2006). It seems that around 20% of dreams (recent dreams of young adults, and recurrent dreams) feature realistic

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threats to the dreamer, while successful threat avoidance occurs in less than 5% of these reports (Malcolm-Smith & Solms, 2004; Malcolm-Smith et al., 2008a; Zadra et al., 2006). Likewise, although the incidence of threatening dreams is increased in post-traumatic situations, evidence of successful threat-avoidance responses in such dreams is typically lacking (Punamaki, 1999; Valli, Revonsuo, Palkas, & Punamaki, 2006; Valli et al., 2005).

The authors of TST point out that even the low rates of dream threat evidenced above still suggest that the incidence of threatening situations in dreams is far higher than that experienced in waking life (Valli & Revonsuo, 2009; Valli, Strandholm, Sillanmäki, & Revonsuo, 2008). These low percentages may also represent a disproportionately high incidence of dreams with threatening content in relation to all possible instinctual-emotional contents. This raises the question of the relative contributions to dream content of the various basic emotions. To begin to address this question, it is necessary to compare the incidence of threat-avoidance behavior in dreams with that of at least one other instinctual-emotional behavior, with an equivalent but different biological function. For this purpose we have selected exploratory-interest behavior, associated with the mesocorticolimbic dopamine circuit variously described as the 'reward', 'wanting' or 'SEEKING' system (Berridge, 1996; Panksepp, 1998; Rolls, 2000). Our rationale is that this system, like the amygdala, is highly activated during REM sleep (Braun et al., 1997; Dahan et al., 2007; Léna et al., 2005; Maquet et al., 1996; Nofzinger et al., 1997), but it is associated with behaviors that are for the most part antithetical to those associated with the amygdala. In essence, whereas the amygdala (the FEAR system, in the nomenclature of Panksepp (1998)) is associated with 'avoidance' behavior, the SEEKING system is associated with 'approach' behavior.

This 'avoidance' versus 'approach' dichotomy seems an appropriate place to begin to address the question of the relative contributions to dream content of the different instinctual emotion systems, but it cannot by itself provide a definitive answer. Several such systems exist in the mammalian brain, with more complex behavioral properties than mere avoidance or approach, and there are overlapping spheres of influence between them (Panksepp, 1998). The relative contributions of all these systems must ultimately be assessed in relation to each other. However, a rationale for comparing the incidence of 'avoidance' and 'approach' behaviors in dreams in this initial attempt to address the question, is the fact that Solms has hypothesized that dreaming is generated by mesocorticolimbic dopamine activity, and in fact represents SEEKING activity during sleep (Solms, 2000, 2011). Similar hypotheses have been advanced by others (Gottesmann, 2002; Panksepp, 1998; Rotenberg, 1993). The comparison we have set for this initial study therefore serves the additional purpose of testing an alternative prediction, arising from another recently influential dream theory.

2. Method

2.1. Sample

Purposive sampling was used to obtain dream reports from participants living in high versus low actual threat contexts, namely undergraduate psychology students at the Universities of Cape Town and Wales (Bangor). The students were not familiar with Revonsuo's or Solms's theories or with the aims of the study. Participation was voluntary and the research conformed to the ethical guidelines of both universities. Among the South African participants, 49.15% had experienced a real life-threatening event in the past 4 years whereas the figure for the Welsh participants was 21.59% (Malcolm-Smith et al., 2008a).

2.2. Procedure

The 'Most Recent Dream' method was used to obtain the dream reports. This method provides a representative sample of dreams, indistinguishable in content (according to the measures of Hall and Van de Castle's (1966)) from those obtained in sleep laboratory settings (Domhoff, 1996). The questionnaire was distributed at the end of a lecture period. As is customary with this method, reports of recurrent dreams and those containing 50 words or less were excluded from the analysis. This yielded a sample of 208 South African and 116 Welsh dream reports, from which 105 reports were randomly selected from each college population. This sample size is sufficient to replicate Hall and Van de Castle's (1966) norms and thus is argued to provide a reliable representation of dream content (Domhoff, 1996).

The reports were coded by three independent raters who were blind to the hypotheses of the study and the provenance of the dream reports. Raters were asked to code the central events of dream reports in a forced-choice paradigm, as globally involving either 'avoidance' or 'approach' behavior on the part of the reporting subject. 'Avoidance' behavior was defined as: '*the main activity of the subject of the dream is an attempt to avoid something through fleeing, freezing, hiding or the like*'. 'Approach' behavior was defined as: '*the main action of the subject of the dream is an attempt to approach something through engagement, exploration, curiosity or the like*'. Raters were instructed to code the dream in accordance with the dreamer's actual behaviors rather than their subjective feeling states in the dream (whether described or inferred). This was necessary to take account of instances in which behaviors and feelings contradict each other. To enhance validity and reliability, coding guidelines were provided, using characterizations of typical behaviors associated with the FEAR and SEEKING systems as examples of 'avoidance' and 'approach' behaviors respectively (see Appendix A). These were derived from Panksepp (1998) and Davies, Panksepp, and Normansell (2003). Before rating the 210 dream reports collected for this research, raters were asked to rate a sample of twenty reports from another source obtained by the same method. The percentage of perfect