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Reply

Is the threat simulation theory threatened by recurrent dreams? ☆

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Abstract

Zadra, Desjardins, and Marcotte (2006) tested several predictions derived from the Threat Simulation Theory of dreaming (Revonsuo, 2000a) in a large sample of recurrent dreams. In response to these findings, Valli and Revonsuo (2006) presented a commentary outlining alternate conceptualizations and explanations for the results obtained. We argue that many points raised by Valli and Revonsuo do not accurately reflect our main findings and at times present a biased assessment of the data. In this article, we provide necessary clarifications and responses to each one of their main points of discussion.

Keywords: Threat simulation theory; Recurrent dreams; Dream content

Zadra, Desjardins, and Marcotte (2006) tested a number of basic postulates and predictions derived from Revonsuo's (2000a) threat simulation theory (TST) in a sample of over 200 recurrent dreams. As a follow-up to this study, Valli and Revonsuo (2006) wrote a lengthy and stimulating commentary in which they suggested alternate ways of conceptualizing and interpreting our results. We believe that certain findings presented in our original article were misunderstood by Valli and Revonsuo and that some of their comments are inaccurate. The issues covered in the response to their commentary are structured around five main points: (1) clarification of the concept of adaptation, (2) differentiation between everyday dreams and recurrent dreams, (3) the proportion of recurrent dreams that contain realistic and probable threats, (4) the dreamer's reaction to the threatening events, and (5) categorization of various kinds of threats found in dream narratives.

1. Clarification of the concept of adaptation

Valli and Revonsuo (2006) begin their commentary by presenting a detailed clarification of the concept of "adaptation" and state that the *correct* interpretation of this term has implications for the empirical testing of

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TST. In doing so, they implicitly suggest that we incorrectly defined this key concept and that we also failed to clarify an important difference between the concepts of biological and psychological adaptation. This is both wrong and misleading. In fact, great care was taken in the introduction of our article to clearly present TST in the context of biological, as opposed to psychological, adaptation by citing for instance its importance for physical survival and reproductive success. That TST was situated in its proper biological evolutionary perspective is clear from the following introductory paragraph:

> Human evolution took place in a very threatening environment in which the capacity to repeatedly simulate confrontations with different kinds of dangers would have provided a certain adaptive advantage. By giving rise to a full-scale hallucinatory world of subjective experience during sleep, the dream production mechanism provides an ideal and safe environment for such sustained practice by selecting threatening waking events and simulating them repeatedly in various combinations. The adaptive function of dreams is thus related to threats present in our ancestral environment, and dreaming would still serve the same biological function today . . . The ancestral environment in which the human brain evolved included frequent dangerous events that constituted extreme threats to reproductive success. They thus presented serious selection pressures to ancestral human populations and fully activated the threat simulation mechanisms.

The discussion section of our article also made a clear distinction between physical threats (the main types of threats our ancestors had to contend with), and psychological threats, which many humans face in contemporary settings and everyday lives. This distinction was presented in the context of highlighting potential shortcomings of TST as applied to dreaming processes in language-endowed humans where oneiric representations are most likely structured through the use of conceptual metaphors. We thus suggested that when faced with very real but different types of threats from what it was it originally conceived, the threat simulation system is nonetheless activated but occasionally misses the mark. We do not find, at any point in our article, any ambiguity as to the indirect testing of the *biological* function (linked to the survival and reproduction of the species) of dreams as originally formulated by Revonsuo.

Although not discussed in our article, we question Valli and Revonsuo's (2006) reluctance to consider that psychological adaptation to one's environment can play a role in reproductive success. Science no longer entirely dissociates mental from bodily processes, and many disciplines have adopted a "bio–psycho–social" perspective in which biological, psychological and social entities are intertwined with multiple cross-influences. It can be argued that the overall chances of survival and reproduction are compromised in individuals whose mental health is severely weakened. Moreover, impaired mental health or psychological well-being is rarely without consequences on physical and behavioural levels. The state of depression, which is generally associated with loss of appetite, diminished libido, disrupted sleep, psychological withdrawal, etc., is but one example of this. Psychologically maladapted individuals are also more likely to try to kill themselves. Biological and psychological adaptation together contribute to the survival and reproduction of the ancestral human species. If it is "more adaptive to suffer psychologically and survive than to feel great but perish quickly" (Valli & Revonsuo, 2006), we could paraphrase this and maintain that it is more adaptive to be mentally equilibrated and reproduce than to be psychologically disturbed and not have offspring.

2. Differences in the frequency of threats in everyday dreams versus recurrent dreams

In addressing divergent results in the frequency and severity of threats observed in our sample of recurrent dreams versus their findings on everyday dreams, Valli and Revonsuo (2006) dedicate part of their commentary to "the possible effects of different data collection methods on the results." In this section, they essentially suggest that the observed differences may be due to dream report length, sampling methods or memory bias. To an inattentive reader, this part of the commentary may be taken to suggest that we failed to take into consideration such possibilities when discussing the disparity in threat frequency and severity between everyday dreams and recurrent dreams and that the "possible effects of different data collection methods" put forth represented new and valuable considerations. Both of these impressions would be erroneous. The truth of the matter is that each one of these three methodological points was explicitly brought forth in our article.

3. Proportion of recurrent dreams that contain realistic and probable threats

The third point raised by Valli and Revonsuo (2006) concerns their disagreement with our interpretation of the data as indicating that the majority of recurrent dreams do not constitute realistic threat simulations. The numbers are as follows: 34% of the recurrent dreams had no threatening elements whatsoever and that more than 80% of the threats found in the remainder of our sample were not realistic or probable. In other words, less than 15% of recurrent dreams studied contained realistic and probable threats. We thus continue to believe that the data support our conclusion that most recurrent dreams do not constitute realistic threat simulations.

While Valli and Revonsuo (2006) acknowledge that these results represent a challenge to TST, they nonetheless maintain that threats of a fictional nature or very unlikely to occur in the subject's waking life may be just as effective as realistic threatening events in activating perception and avoidance skills. This may or may not be the case but given the absence of any empirical assessment of the issue, this affirmation remains conjectural. In support of the position that fantasy-based threats can be as effective as reality-based simulations, the authors suggest that it makes very little difference whether it is a realistic wolf or a werewolf chasing you in the dream. And with this well-chosen example we certainly agree. However, we find it difficult to see the use of successfully perceiving and avoiding many other types of threats noted in recurrent dreams (i.e., events that would be considered threatening to the physical or mental well-being of an individual if they really occurred in the waking state) that rarely or never occur in everyday life. For instance, how do recurrent dreams about one's teeth falling out, having bathroom walls disappear when you go to the washroom, being visited by a deceased person, or flying perilously over a body of water (events that would be at least psychology troubling for most) contribute to the individual's biological adaptation and to the maintenance of his or her reproductive abilities? It also bears noting that this recent affirmation appears to be inconsistent with a previous statement by Revonsuo and Valli (2000) to the effect that: "If we are on the right track with the threat simulation hypothesis, then we should find ... that dream threats should be relatively realistic."

Finally, it was suggested that the hypothesis of "threat scripts" could be directly studied, for example, by examining the rate of incorporation of violent computer games and other emotionally arousing but fantasy based "virtual-reality" stimulation into recurring threat simulation dreams. Although a study of the rate of incorporation into everyday home or laboratory dreams would certainly be feasible and most interesting, this is not the case for recurrent dreams for two reasons. First and foremost, recurrent dreams occur very infrequently (only one recurrent dream has ever been reported in laboratory studies and less than 2% of home dream reports are recurrent dreams). Second, it would be difficult to assess how changes in the content of recurrent dreams (or along what dimensions) would provide evidence for incorporation as any significant distortions or alterations in the dream report would raise the question of whether or not we were in fact dealing with the original "recurrent dream."

4. The dreamer's reaction to the threatening events

The fourth point raised in the commentary appears to us as reflecting the authors' tendency to gloss over data that contradict TST while focusing on elements that support it. In response to the finding that only a small proportion of recurrent dreams portrayed a successful action in reaction to a threat, Valli and Revonsuo (2006) point out that the dreamer showed active participation in 78% of the cases. They are correct and this percentage is reported in the original article. This figure, however, in no way changes the fact that successful escapes were exceedingly rare. The commentary itself reports that: "Even though the dreams ended with the threat being fulfilled in 40% of the cases, in those cases the dreamer often remained inactive or reacting was impossible to begin with." In other words, the dreamer rarely succeeded in escaping the threat or overcoming it, which is exactly what we conclude. The importance (or lack thereof) of successful threat avoidance is discussed at length in the original article and we do not see the need to re-examine this issue here. But the fact remains that less than 1 in 5 of the recurrent dreams studied contained a *successfully* resolved threat.

Valli and Revonsuo (2006) also highlight the results of our analyses showing that "the probability of overcoming the threat is much higher when defensive actions are taken against it then when the dreamer remains,

or is forced by the circumstances to remain, inactive.'' On the other hand, their argument would have been more accurate (and less forceful) had they also reported the finding that the dreamer's active participation did not lessen the probability of the threat giving rise to a negative outcome.

Finally, with respect to the question of what constitutes an ''adequate'' response, the commentary suggests that virtually any response can be construed in some sense or another as being adequate. We question the heuristic value of such an approach. In sum, we stand by our statement that when it comes to dreamed threats, the perceptual component of TST may very well be present in recurrent dreams but there is little evidence for successful avoidance behaviors.

5. Categorization of threats

The last issue discussed in the commentary primarily concerns the categorization of threatening elements described in dream reports. After observing, for example, that the prevalence of escapes and pursuits in our sample differed from what was found in their study, Valli and Revonsuo (2006) suggest that escapes and pursuits could be considered as particular forms of aggression. Once categorized in this fashion, the proportion of dream reports containing this type of threat becomes similar in both studies.

We do not see the reasoning behind grouping these categories after the fact. When we tabulated the proportion of dreams containing escapes and pursuits or various forms of aggression, we used the same content categories that were original reported in Revonsuo and Valli's (2000) study. We also find it unsurprising that the two data sets would yield different results given that the studies fundamentally differed in a number of key aspects (e.g., everyday dreams versus recurrent dreams, prospective versus retrospective data collection, etc.). Moreover, if we were to combine all of the threat categories, one would obtain a perfect (100%) consensus between the two studies.

With respect to the category ''Emotional difficulties,'' the authors write that the scoring of this category seems problematic as such difficulties are seldom experienced without an external threat and in essence reveal a discrepancy between the subject's current situation and a desired goal. This is a valid explanation and makes sense when considering the subjective experience of individuals in their waking state. However, this may not be the case when the subject is asleep and dreaming. The dreamer may in fact report having experienced negative emotions (sadness, anger, fear, etc.) that do not stem from a previous event (forgotten or otherwise) in the dream narrative.

Regarding the fact that physical difficulties are found in a much higher proportion in recurrent dreams than in everyday dreams, Revonsuo (2000b) suggests that they may be linked to the dreamer's actual physical state (full bladder, fever, illness, etc.). Although intriguing, this hypothesis could be generalized to other categories of threats. For example, one could postulate that dreams of falling could be related to physical cues that the dreamer is positioned close to the edge of the bed. As for the environmental anomalies found in 9% of recurrent dreams, it would be surprising that they would be accountable by the fact that almost 10% of our subjects suffered from fever or other illness. That said, the basic idea is interesting as there are numerous published accounts of somatic or sensory stimuli affecting dream content but the role of bodily states in recurrent and everyday dream content remains to be empirically investigated.

As stated in our original article, 6 of the 8 predictions drawn from TST as presented by Revonsuo (2000a) were supported by a detailed content analysis of recurrent dreams. The fact that less than 2% of these dreams supported all of the original predictions (i.e., by containing a dangerous threat that was realistic, likely to occur in waking life, aimed directly at the dreamer, and which elicited a plausible and reasonable reaction that allowed the dreamer to avoid its potentially negative consequences) is not trivial. It also bears noting that the 2 predictions not supported (i.e., the dreamer will succeed in overcoming or escaping the threat and that the threatening situations will be realistic rather than bizarre fantasies or science fiction stories) are among the most important and specific for TST. Hence, we maintain our position that the data provide mixed support for the threat simulation theory. Revonsuo is commended for putting forth a testable, stimulating and well articulated theory of dreaming. Only time, and the publication of further studies, will tell whether TST will need to undergo transformations, whether it will survive, or whether it will be eclipsed by competing models better adapted to ever-evolving findings.

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