

Dreaming Is Play II: Revonsuo's Threat Simulation Theory in Ludic Context

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I. INTRODUCTION

Researchers in the field of dream studies (DS) are simultaneously blessed and cursed by a sudden wealth of new data. We are blessed because we now have available a huge and growing number of important findings from the neurosciences, experimental psychology, content analysis, and cross-cultural and historical studies. We are cursed, however, because the theoretical models that dominated 20th century DS research (e.g., psychoanalysis, cognitive psychology, physiological reductionism, the culture and personality school of anthropology) are incapable of making sense of this onslaught of information. The challenge is to develop broader, more inclusive, and better integrated theories that can reorient us amid the cascade of data and help us move forward in finding answers to the practical questions that drive our respective projects.

Achieving that goal depends on how well we can cultivate the interdisciplinary sophistication of DS research. For this reason, Antti Revonsuo's Threat Simulation Theory (TST) of dreaming is worthy of our concerted attention. Revonsuo's work goes farther than most in using multiple sources of dream research and weaving their findings into a conceptual whole. In this paper I will evaluate

Revonsuo's TST in terms of its interdisciplinary adequacy and its usefulness for future research. Specifically, I will consider a) his approach to the study of dream content, b) his focus on one recurrent type of highly memorable dreaming, i.e., chasing nightmares, and c) his attempt to locate dream phenomenology in an evolutionary context. Then I will argue that the strengths of the TST can be made even stronger, and its weaknesses rendered less problematic, by integrating its major claims within a broader view that regards dreaming as imaginative play during sleep. To anticipate my conclusion (and to explain the paper's title), I will draw on ideas first expressed in a 1993 article, "Dreaming is Play," to argue that major findings from multiple sources of DS research can be best understood when seen in ludic context, as expressions of an innate capacity for playful creativity (1). Having this capacity, i.e., being able to play and dream, provides several adaptive benefits for humans, including but not restricted to the threat simulation function postulated by Revonsuo. In contrast to claims that dreaming is merely a "spandrel of sleep" serving no adaptive purpose (2-4), a "dreaming is play" perspective brings into relief the contribution of dreams to the healthy functioning of the creative imagination.

II. The BBS Special Issue and the Self-Deconstruction of the DS Field

Revonsuo presented his TST in the December 2000 issue of the journal *Behavioral and Brain Sciences*, a special issue devoted to

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sleep and dreaming. The full significance of Revonsuo's theory only emerges when it is considered in connection with the other contributions to that special issue of BBS.

Taken as a whole, the five target articles, seventy-six commentaries, and five author responses in the BBS special issue amount to a self-deconstruction of the DS field (5). What initially looks like a state-of-the-art overview of sleep and dream research turns out on closer inspection to be a group confession of discord and disunity. Consider the following disagreements on fundamental issues:

1. There is no longer anything close to a consensus on the relationship between REM, NREM, and dreaming. The Hobson-Solms feud is but a personal instance of a wider fracturing of belief about how sleep physiology relates to dream psychology. Since much of the last 50 years of dream research has proceeded on the basis of a simple REM=dreaming isomorphism, the growing dissension on this point is a devastating blow to the traditional coherence of DS.
2. The REM-NREM relationship is itself now open to question. Nielsen admits in his BBS article that the scoring of sleep stages is a much messier and more arbitrary process than is usually acknowledged. Several other contributors confirm this: The standard sleep science framework of REM and four stages of NREM sleep is in fact a simplistic, artificial construct that obscures the multidimensional fluidity of actual sleep experience (6-10). Whatever one thinks of Nielsen's notion of "covert REM" (by which dreams reported from NREM sleep are explained as the products of covert intrusions of REM dream generating processes into the NREM state), his target article represents a profound destabilizing of the traditional architecture of sleep physiology used by DS researchers.
3. Another traditional pillar of DS research is forcefully attacked by Vertes and Eastman,

namely the idea that REM sleep (and dreaming) contribute to learning, information processing, and memory consolidation. Vertes and Eastman scrutinize the research literature on REM deprivation, which has long been taken to show that REM sleep is necessary for memory and learning, and they find that prior studies have failed to provide solid evidence to support such a claim. They retreat to the theoretical position that the chief function of REM processes is to help preserve sleep, and they grant dreaming no functional role whatsoever.

4. Several BBS commentators challenge the reliability of subjective reports as an accurate means of studying dreams (10-16). People's descriptions of their dreams are influenced by a number of linguistic and cultural variables, leading them to exaggerate some things and omit others. In addition to those uncertainties, it's always possible that a dream report is simply a fabrication. Such basic problems call into question the scientific legitimacy of any and all research on dream content.
5. The very definition of dreaming is up for grabs, as Pagels' commentary shows the many incompatible usages of the term throughout the BBS issue (17). Pagels emphasizes the same point I made above, that the breakdown of the REM=dreaming model throws wide open the questions of what exactly we mean when we speak of dreams and dreaming, and what exactly we're trying to do when we study them.

Many other areas of profound division and sharp dissent are evident in the BBS issue, making it clear that DS is a field in deep conceptual turmoil. We don't need a Foucault or a Derrida or any postmodernist graduate students to come in and deconstruct the DS field. We're doing a fine job of that all by ourselves.

This is the textual setting in which Revonsuo presented the major statement of his TST. His

article received a largely negative response from the other contributors, though a few defenders came to the fore. The TST was faulted most severely for a) its failure to account for the many dreams that do not involve threats, b) its myopic focus on just one dream function with insufficient attention to other possibilities, c) its incompatibility with research on PTSD and chronic nightmare sufferers, d) its hazy explanation of how the mechanism of threat simulation actually works, and e) its fallacious assumption, so common in evolutionary psychology, that anything with form (e.g., recurrent nightmares) must have an evolutionary function (e.g., threat simulation).

These are serious charges, and despite Revonsuo's spirited defense I agree with his critics that the TST as formulated does not succeed as a full accounting of human dream experience. It may, however, succeed in the more modest sense of being "regarded as one of the least implausible attempts to explain why we dream." In any case, what I believe is most important about Revonsuo's work is its interdisciplinary ambition. Whatever its ultimate fate as a grand theory, the TST strives to establish meaningful connections across several different areas of research. This is exactly the kind of effort that's necessary for the future progress of the DS field, especially in this time of great conceptual confusion. We can learn much by examining Revonsuo's successes and failures in this interdisciplinary pursuit.

III. Dream Content

Alone among the five major articles in the BBS special issue, Revonsuo's looks at dream content and not just dream form (18). The other articles only speak of dreaming as a phenomenon with a few general features (e.g., visual imagery, emotionality, deficient memory, bizarreness, etc.), and say little about the contents of any particular dreams. Revonsuo, however, makes extensive use of content analysis data from the Hall and Van de Castle

norm dreams and from his research team's studies (as well as his own personal dreams) (19). He says the high frequency of negative, aggression-filled dreams in which the dreamer is threatened by animals and/or male strangers is consistent with the biological and neuroscientific evidence in support of the TST. Although Revonsuo's use of the Hall and Van de Castle material is not endorsed by G. William Domhoff (the leading advocate of the HVDC system), and although his own studies are open to the charge that he's just proving what he wants to find, this key point should not be overlooked: Revonsuo is affirming the importance of dream content as a source of evidence for proving or disproving theories about dreaming. The same point can be stated more emphatically in negative terms: No dream theory can be adequate if it fails to account for the varied contents of what people actually dream about.

It is perhaps a symptom of the DS field's theoretical turmoil that this basic principle has to be emphasized, but the absence of any reference to dream content in a majority of the BBS contributions makes it necessary. In particular, the idea that subjective dream reports are scientifically worthless must be rejected. Such an idea represents intellectual cowardice masquerading as methodological rigor. Yes, subjective dream reports are shaped by multiple influences and may in a few cases be outright fabrications. But that does not mean valuable information, knowledge, and insight cannot be gained from personal dream reports. It means that research on dream content must be conducted very carefully, by gathering as many reports from as many different people as possible, using well-tested coding categories, and maintaining a keen awareness of the linguistic, cultural, and interpersonal variables that color the data. (The irony is that while skeptics regularly challenge the validity of subjective dreams reports, no one ever questions the oft-made claim that some people never remember any dreams. Could such

people be merely *saying* they never remember their dreams, particularly if they are influenced by negative cultural attitudes toward dreaming?)

As for the suggestion that a dream report is only a verbal construct with no necessary connection to the dream experience, such a claim rests on the faulty assumption that there is some pure, pristine ur-dream that exists prior to linguistic and cultural influences. It is much more likely that linguistic and cultural influences are active within the dream formation process itself, making unnecessary the artificial division between the "real" dream and the dream report. Anthropologists have been saying this for years, and even Freud recognized that so-called "secondary elaboration" can operate within the dreamwork (20-23).

The study of dream content, while unquestionably difficult, is not impossible, and it should remain a vital element in DS research. The spoken and written words of subjective dream reports may not provide a perfectly transparent window into the psyche, but they nevertheless do provide us with legitimate, reliable information about dream experience. Revonsuo's TST illustrates the value of using dream content data in the creation of new theoretical syntheses.

IV. Highly Memorable Dreams

Revonsuo focuses special attention on one particular type of highly memorable dream, namely the chasing nightmare. Cross-cultural and historical evidence indicates that chasing nightmares are a widespread phenomenon, characterized by vividly frightening images and powerful negative emotions that make a strong and lasting impression on the dreamer. While the vast majority of dreams are usually forgotten, dreams like this forcibly imprint themselves on waking consciousness and remain intensely memorable for a long time, often lasting throughout the individual's life.

Revonsuo is right, I think, to concentrate special attention on dreams with such a forceful impact on waking awareness. If dreams (as distinct from REM and/or NREM sleep) have any function or value, it will likely manifest itself in those dreams that most consistently make a strong impact on waking consciousness (6,12,14,16). Cross-cultural and historical evidence, combined with content analysis data (cf. Thomas Gregor's work on 24), enable us to identify a variety of recurrent patterns in highly memorable dreams.

The chasing nightmare is undoubtedly one such pattern, but it is hardly the only one. Here I join with many of Revonsuo's BBS critics in questioning his exclusive focus on this type of dream. The TST suffers from a lack of phenomenological pluralism: the chasing nightmare is taken as the paradigmatic dream, and all other dreams are regarded either as nothing but milder variations on the same theme or as simple neural nonsense. I do not believe the future of DS research will be well served by that kind of approach. Instead, I share the goal of Harry Hunt and others (Jung, Knudson, Kuiken, Adams, Krippner, Bogzaran) in seeking to develop a much more detailed portrait of "the multiplicity of dreams." We already have abundant about the recurrence of other types of highly memorable dreams, including flying, visitations from the dead, prophecies, nightmares, existential loss, lucidity, intensely arousing sexual feelings, and transcendent/divine experience. Much work needs to be done to expand and clarify our knowledge here, but no one can deny the empirical fact that such recurrent types of extraordinary dream do indeed occur, and no one can propose an overarching theory of dreaming without taking them into account.

Future investigations of highly memorable dreams may find it useful to follow up on two brief, almost stray comments in the BBS issue. The first is Mark Solms' observation that a certain pattern of damage to the brain produces what he terms *anoneirognosis*, or "excessive

dreaming (25). He says, “lesions in anterior thalamus, basal forebrain, anterior cingulate, and mesial frontal cortex cause excessively vivid and frequent dreaming, a breakdown of the distinction between dreaming and waking cognition, and other reality-monitoring deficits” (26). I find this interesting because highly memorable dreams are often reported to feel intensely real, with such unusual vividness that the dreamer is momentarily shaken in his or her ordinary sense of the difference between waking and dreaming (see for example William Dement’s dream, quoted below). Perhaps future research can explore more deeply both the form and content of dreams from brain lesion patients with anoneurognosis and identify more precise connections with highly memorable dreams reported by healthy subjects.

The second noteworthy comment comes early in Tore Nielsen’s target article, when he offers a schematic diagram of “four levels of specificity in defining sleep mentation.” The first and most deeply embedded level in the diagram (The yolk of the egg? The germ of the seed? The pupil of the eye? The nucleus of the cell?) is termed “Apex dreaming,” and it is defined as including “the most vivid, intense, and complex forms of dreaming: e.g., nightmare, sexual, archetypal, transcendental, titanic, existential, lucid” (27). Nielsen says “such vivid dreaming occurs frequently during REM sleep but rarely during NREM sleep.” Little more is made of apex dreams in Nielsen’s article or in any of the commentaries, but here I think is another important insight that should be explored in greater depth. Can the different types of apex dreaming be correlated with specific patterns of REM activation? What new neural processes are added into ordinary REM sleep to spark the generation of an apex dream? How do the brain-mind activation patterns of REM apex dreaming relate to the patterns that predominate in NREM sleep, and in normal waking consciousness?

If we could develop the interdisciplinary sophistication necessary to find good, solid

answers to these questions, we could open a very exciting new era of DS research.

To summarize this section: Revonsuo’s TST is an outstanding effort to understand one specific type of highly memorable dream, the chasing nightmare. However, he either ignores or mischaracterizes the other types of widely occurring, deeply impactful dreaming. What Revonsuo has begun with chasing nightmares should now be continued with other intensified dream forms. Solms’ diagnostic category of anoneurognosis and Nielsen’s notion of apex dreaming are two possible leads to pursue.

V. The Evolutionary Context

A major strength of Revonsuo’s TST is that he seeks to locate dream phenomenology in an evolutionary context. Recent advances in evolutionary psychology (a cognitively-oriented version of sociobiology) have provided important insights into the nature, shape, and functioning of the brain-mind system (28-32). The human species first emerged and competed for survival several hundred thousand years ago on the African Savannah. The conditions of that primal environment led to the development of certain cognitive abilities (“modules”) that allowed our ancestors to survive and reproduce successfully. To understand human psychology, then, it is necessary to “reverse-engineer” our mental abilities and ask what adaptive function they served in the early ancestral environment of the human species. Revonsuo’s project is exactly this, an attempt to reverse-engineer chasing nightmares. He argues that such dreams improved the ability of early humans to escape their predators. By simulating what it would feel like to be attacked, the dreams gave the individual an opportunity to prepare an effective response should a similar attack ever actually occur. The early humans who experienced such dreams had a better chance of survival than those humans who didn’t, and thus the threat simulation propensity of dreaming was incorporated by natural selection

into the innate mental machinery of our species.

Revonsuo is wise to connect DS research to evolutionary thought, and I daresay every contributor to the BBS issue, including his worst detractors, agree on the primacy of a Darwinian perspective. The disagreements have to do with the difficulty, if not impossibility, of proving that chasing nightmares or any other type of dream has a genuinely adaptive function. Flanagan, Blagrove, and others reject Revonsuo by claiming dreams are epiphenomenal accompaniments of sleep, with no evolutionary function whatsoever. Sleep may have adaptive benefits, but dreams do not. In this view the content of dreams is best understood as a reflection of personal experience and cultural influence, not as a genetically programmed simulation of ancestral threats. Revonsuo has pushed the reverse-engineering process too far, his critics say, by mistakenly attributing an evolutionary function to a feature of mental functioning (dreaming) that in fact was simply a by-product of something else (sleep) that did have an evolutionary function.

We should be wary of semantic game-playing here. Countless developments in evolution began as mutations, accidents, and epiphenomena. The distinctions we make between what does and does not qualify as an evolutionary function may be no less artificial than the distinctions we have been making between REM and the different stages of NREM sleep. Indeed, not just Revonsuo's TST but the whole enterprise of evolutionary psychology and reverse-engineering should be regarded with a healthy skepticism, given how easy it is to weave plausible stories about the primal origins of this or that mental faculty.

For these reasons we cannot wholly accept the evolutionary reasoning of Revonsuo's TST, but neither can we wholly reject it. What we can do is continue gathering evidence of threat simulations in dreams and see where that evidence leads us. In my research and my own

dreaming I have had little trouble finding numerous instances of threat simulations:

- Young women dreaming they are pregnant, and realizing with alarm they are unprepared to become mothers.
- Parents dreaming of dangers to their children (e.g., being hit by cars, kidnapped, swept away by waves, etc.).
- Children dreaming anxiously about potential difficulties in new classes, schools, camps, etc.
- Adults dreaming of car accidents, accurately portraying what is in statistical terms one of the greatest daily threats to life and limb.
- After September 11, people dreaming of how they would respond if they were subject to attack by terrorists and hijackers. An example from my study with Tracy Kahan on dreams in relation to 9/11, a dream of a female American college student: "I was a passenger on an airplane and I was prepared in the event that there were hijackers on the plane. I made sure I had an aisle seat so that if there were terrorists on the plane I would be able to attack them."

A particularly striking threat simulation dream was reported by William Dement in his 1972 book *Some Must Watch While Some Must Sleep*:

"Some years ago, I was a heavy cigarette smoker—up to two packs a day. Then one night I had an exceptionally vivid and realistic dream in which I had inoperable cancer of the lung. I remember as though it were yesterday looking at the ominous shadow in my chest X-ray and realizing that the entire right lung was infiltrated. The subsequent physical examination in which a colleague detected widespread metastases in my auxiliary and inguinal lymph nodes was equally vivid. Finally, I experienced the tremendous anguish of knowing my life was soon to end, that I would never seem my children grow up, and

that none of this would have happened if I had quit cigarettes when I first learned of their carcinogenic potential. I will never forget the surprise, joy, and exquisite relief of waking up. I felt I was reborn. Needless to say, the experience was sufficient to induce an immediate cessation of my cigarette habit (32).

Note that what is simulated in Dement's dream is the threat (lung cancer) but not any adaptive response to the threat. Several of Revonsuo's critics fault him on this point, arguing that dreaming about threats can only be adaptive if the dreams rehearse practical responses. But as Dement's case shows (just like the other threat simulation types mentioned above), the dream portrays the threat with such vivid immediacy that the individual is spurred upon awakening into taking appropriate action. The intense memorability of the dream motivates greater waking attention to a dire threat in the environment, a threat of which the individual may not be sufficiently aware.

Dream reports like this support the basic thrust of Revonsuo's evolutionary claims, and future DS research will likely reveal further variations on the threat simulation theme. Revonsuo is not the first, of course, to propose this kind of function for dreaming. Jung spoke of "the prospective function," Ullman of dreaming as maintaining an optimal state of "vigilance," Snyder of sleep and dreaming as a "sentinel" system to prepare for environmental danger, Cartwright of dreams as "rehearsals" for future actions, and Taylor of nightmares in particular as warnings of dangers to the dreamer's survival (33-37). While differing on many details, these researchers share with Revonsuo the basic insight that dreaming helps humans anticipate and prepare for possible threats in their waking lives.

Much more investigation is needed to substantiate that insight, but Revonsuo is on the right track. The adaptive benefits of such anticipatory dreams are self-evident. In some cases—we don't know how many, but it's more

than a few—highly memorable dreams prompt young women to be more cautious about getting pregnant, parents to be more protective of their children, drivers to be more careful behind the wheel, smokers to quit their habits. The question remains, of course, whether the benefits of threat simulation dreams are generated by innate psychological programs or are produced by the external pressure of cultural influence and expectations. Cultural influences are certainly powerful, and what humans can intentionally make of dreaming goes far beyond what dreaming originally evolved to be. But that's not to say that evolutionary pressures have left no trace on the dreaming process. If we grant the claim that sleep came first in evolution, with dreaming originally appearing as an epiphenomenon, why should we believe a capacity to simulate highly realistic, intensely memorable threats in the environment would lie completely dormant, its potential benefits never realized until the advent of culture? Isn't it more likely that evolution would quickly develop an adaptive use for such a powerful visionary capacity?

These are very speculative questions, and beware anyone who offers simple answers to them. The point here is to clarify what we are doing when we try to conceptualize dreaming in evolutionary terms. Revonsuo's TST may fail as an adequate formulation of the evolutionary function(s) of dreaming, but he is surely correct in emphasizing the importance of connecting DS research to the biology of consciousness.

VI. Dreaming Is Play

An alternative perspective that accounts for all of Revonsuo's data and overcomes his theory's major failings is the idea that dreaming is a form of imaginative play during sleep. As several BBS contributors noted (38-40), dreaming and playing share a number of well-documented similarities:

- Dreaming and playing both involve the creation of a quasi-real space, a special

- environment set apart from non-play reality.
- Both are relatively safe, in that dreaming and playing actions do not have the same consequences that similar actions would have outside the imagined space.
 - Strong emotions often emerge in dreaming and playing, both positive ones (affection, happiness, pleasure) and negative ones (aggression, frustration, anger, sadness).
 - Dreaming and playing both take their raw material from the major survival concerns of daily life.
 - Both have a tendency toward extravagance, exaggeration, and rich variation.
 - The rules, boundaries, and structures that govern ordinary life are suspended in both, providing the opportunity to experiment with alternative forms of conceptual organization.

Thinking of dreaming as imaginative play has several advantages for DS research. First, it embraces the best part of Revonsuo's TST, namely its recognition that the historical and cross-cultural frequency of highly memorable chasing nightmares is related to the evolution of the human brain-mind system. Play researchers have long emphasized the evolutionary history of play, pointing to its appearance among all mammal and bird species and its special prevalence among primates, from Old World monkeys to Great Apes to *Homo Sapiens*. Humans engage in a greater amount and variety of play than any other species. Threat simulations are a regular staple of play behavior in all species, and Revonsuo's TST is a helpful way of thinking about the same play processes occurring in sleep.

Second, the dreaming-is-play view overcomes the TST's problematic lack of pluralism. The cognitive capacity to create a vividly realistic experience of self-in-world can simulate threats and anything else it pleases—the multiplicity of types of highly memorable dreaming is an inevitable consequence of human evolution. In contrast to theories that

privilege one particular type of dream as paradigmatic, a dreaming-is-play approach takes as its point of departure the well-documented fact that there are several types of recurrent, highly memorable dreams. Some of these types occur more frequently than others, but each reflects a powerful visionary capacity that operates outside the ordinary control of waking consciousness.

Third, the ludic perspective accounts for the high degree of sociability in dreaming (something ignored by the TST). As Breton, Kahn, and others have argued, dream content abundantly reflects the innately social existence of the human species (41,42). Dreaming (like playing) frequently simulates friendly, aggressive, and/or sexual interactions with other characters (more than 80% of the HVDC norm dreams have at least one of these interactions and/or a physical or verbal interaction with another character). In dreams and in play people act out social dramas, imagining a wide variety of interpersonal scenarios that allow for the safe exploration of different possibilities in the waking world.

Fourth, the play perspective offers a way to appreciate at least some of the ideas of the RATs (Revonsuo's excellent acronym for random activation theorists). Even though Hobson and his supporters stress the idea that dreaming originates in the random neural activation of the brainstem, they acknowledge that synthetic cognitive processes become secondarily activated in order to impose some degree of meaning on the chaotic input. The alleged "bizarreness" of dreaming may be better understood, I propose, if it is viewed as a playful expression of the creative imagination. This suggests a direct and potentially fruitful connection between the playful dimensions of dreaming and the "synthesis" side of Hobson's "activation-synthesis" theory.

Fifth, the phenomenology of post-traumatic nightmares can be understood as a violent interruption of the capacity to play within the space of dreaming. The repetitive nightmares

that characterize PTSD have nothing playful about them—they are dominated by the painful, inescapable reality of the traumatizing event. A connection between dreaming, playing, and psychological health is suggested by clinical reports that therapeutic progress with PTSD patients is accompanied by a transformation of dream content away from literal reenactments and toward “dreamier” imaginings (43-45).

Sixth, this view highlights the need for new research on children’s dreams, given the centrality of play to healthy child development. The longitudinal studies of David Foulkes represent the best current source of data on children’s dreams, but his findings need to be integrated with other sources of evidence about the various types of childhood dreaming experience. In particular, the highly memorable dreams of childhood need to be studied in greater detail (something Foulkes, with his stubborn insistence on the primacy of dream reports in the sleep lab, is incapable of doing). The patterns in children’s highly memorable dreams are very likely connected to the distinctive styles and modalities of their play behavior, and pursuing this connection can give us new insights into the development of stable, personally characteristic dreaming patterns in adulthood (what Domhoff calls the consistency factor) (46).

VII. Conclusion

These are some of the possibilities that come from viewing dreaming as imaginative play during sleep. It’s heartening to find so many commentators in the BBS special issue willing to move in this direction, and even Revonsuo seems open to the idea, though he’s clearly ambivalent about it. He parenthetically agrees that threat simulation occurs in both dreaming and play (“The tendency to simulate dangerous events without any costs during dreaming (and play) are built into present-day humans”) (19), but he is skeptical about the ability of

researchers to prove that the playfulness of dreaming has any evolutionary benefits. To that I say Revonsuo himself has made a major contribution to the effort to build such a case. Indeed, I find it significant that the only note in Revonsuo’s lengthy response is about the adaptive functions of human and animal play. The note comes on p. 1082, and it is the final passage of the entire BBS special issue. Revonsuo summarizes the major theories about play, though he again declines to endorse any of them: “There is some evidence for all these hypotheses, but no single explanation seems to apply across all species or types of play behavior.” In other words, playing is complex, pluralistic, and multi-dimensional. Can we say anything less about dreaming?

Revonsuo ends his singular note with the observation that “there is one crucial difference between play and dreaming in age distribution: in all species, play occurs predominantly during a brief period in the young, after which it is ‘turned off,’ whereas dreaming and REM sleep occur throughout the whole lifetime of an individual.” I’m not sure this is true, at least for humans. Play in the form of cultural experience certainly continues throughout the lifespan, and the capacity to create culture has powerful benefits for a species whose distinctive evolutionary advantage is a highly flexible and imaginative mind. But this is exactly where Revonsuo reaches a limit imposed by his disciplinary commitments. The TST is avowedly anti-cultural and anti-historical. Revonsuo’s only interest is in the function of dreaming in the original ancestral environment. That’s a vital issue to explore—but is it really the most important one for future DS research? What if we are also interested in understanding the development of dreaming since that time, as human nature has shaded into human culture? This is where art and religion and the whole colorful history of cultural creativity become primary sources of DS investigation; this is where we face our field’s greatest need for fresh interdisciplinary thinking.

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