

DREAM FORGETFULNESS

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Abstract

If we wake up during a dream we remember the contents of the dream, but generally only for the blink of an eye. Our dream is quickly erased from our memory unless the dream was highly interesting or shocking or we spend conscious effort to remember it—by jotting it down in a dream diary, for example. An explanation is proposed of why this hasty erasure happens. Despite the apparent initial erasure of dream contents from our memory, we seem to retain at least fragments of some of our dreams for some time, although those fragments are recalled only in certain rare circumstances. This “deep storage” of portions of some dreams in our memory, conjoined with certain other facts about dreams, could be evidence against the view that dreams are useless side-products of the brain’s operations during sleep.

Keywords: dream memory, evolutionary adaptation, evolutionary epiphenomenalism

I. Why are Dreams So Elusive?

Dreams are perhaps the most interesting aspect of the phenomenon of sleep. One curious fact about dreams is that we tend to forget them shortly after waking up. Even before we get up from bed, most of the content of the dream has already evaporated from our memory. We do remember some of our dreams of course (at least for a while), but they are the ones which were interesting or shocking for us, or those we had the chance to tell others about, which kept our memory of them alive. We forget a large preponderance of even the most vivid dreams and frightful nightmares in the twinkling of an eye, unless our memory of them is reinforced by telling other people about them or by intentional recalling. We forget our dreams even though some of them are more vigorous than many waking experiences which we remember for much longer time.

According to one explanation of what physiologically underlies dream forgetfulness, the brain chemicals norepinephrine and serotonin, which play a role in transforming short-term memories into long-term memories, are suppressed and the activity of brain circuits related to short-term memory is attenuated during periods of REM sleep, which are when most dreaming occurs (Hobson, 2003, p.79). Hobson remarks, “It sure looks like we aren’t supposed to remember our dreams. That ... could be because they contain useless or even misleading information that is better ignored than taken too seriously.” (p.79)

If dreams are often not or only fleetingly remembered, what function do they serve for us? Most dream researchers think that dreams have useful functionality.¹ So we must have them. But it seems we also have to rapidly forget them after having them. Why is that? I think there is a simple evolutionary explanation of the phenomenon of dream forgetfulness. If we were to remember our dreams long after we wake up, we would be disposed to confuse the memories of our dreams with the memories of our waking experiences. Suppose I have a dream in which a friend of mine does something evil to me or an enemy of mine does a big favor for me. If my brain were to retain as lively a memory of that dream as the memories of my real life experiences, I might mistakenly think that the contents of my dream correspond to some real experiences of mine that occurred in the past. As a result, my attitude towards my friend or towards my enemy would unnecessarily be affected by that mistake. Such disorientations would clearly have negative survival value and therefore would tend to be blocked by the mechanisms of human evolution.

Others also seem to have come up with the idea that our dreams' fast vanishing from our memory has some evolutionary advantage. A view in some ways similar to mine is advanced by the "dream psychologist" Ian Wallace:

... if our dreams are so important, why do we forget them so easily? ... [W]hy do we let them slip away so easily? The answer is that we naturally seem to forget our dreams because of a simple function of how the dreaming process has evolved biologically.

The evolutionary reason that we forget our dreams is so that we can quickly distinguish between our dreams and waking reality when we wake up. Otherwise we might behave like startled dogs woken from dreams of rabbit pursuit, bewildered and slightly psychotic. In our past, we needed to quickly step from the caves of our dreams into a conscious reality so we could fend off sabre toothed tigers and pursue herds of passing *Megaloceros*.

... Forgetting our dreams was an evolutionary adaptation when we were animals. (2013)

This theory finds the basis of an evolutionary explanation of the phenomenon of dream elusiveness in the circumstance that our cave-human ancestors often had to face a precarious daily reality immediately after they awoke. This may be part of the explanation, but I think it cannot fully explain why we typically forget our dream contents not only right after we wake up, but for good. Why couldn't our ancestors afford to recall, perhaps with some slight effort, what happened in their dreams when they were safe from enemies and other dangers—say, when they were peacefully contemplating the events of the day after a nice dinner at the cave? In other words, in a safe environment, humans could have recalled at least their more pleasant dreams. But that is not the case. The reason, as I said, is that, if the vast majority of our dreams were not to be erased from our memory, we could confuse our dream experiences with our waking experiences, and endure the risks such confusion engenders.

Was erasure of dream memories the only way to safeguard us from confusing the dream world with the real world? Of course there was another route evolution could have taken. Instead of quickly erasing our dream contents, our cognitive system could have tagged those contents as "happened in dream," and tagged the contents of our non-dream experiences as "happened in reality," before sending both of them to our memory. But such an arrangement would seem to be highly cost-ineffective for the brain, unless there was benefit in cluttering our short- or long-term memory with material derived from the dream world.

¹ More on this in section IV.

II. Is My Hypothesis Scientific?

Despite its *prima facie* plausibility, my evolutionary hypothesis about dream amnesia may be challenged as to whether it has any real scientific merit or is mere speculation. Is there a way to test this hypothesis? What observation(s) would discredit it?

That's a fair challenge. My hypothesis is admittedly difficult to test. Obviously, the task of finding evidence for the evolution of dream behavior and its interactions with other behavior (in humans and/or in animals) is not going to be an easy one. Here is an analogy. Why is it that rotten food smells foul? A plausible evolutionary explanation would be: to keep us away from eating rotten food, so we won't risk our survival. But I think concrete evidence for that hypothesis too is hard to come by. It is hard to look into human fossils to piece together the adaptive story of how rotten food came to smell foul for us. Similarly, fossils of our distant ancestors are not going to readily tell us the story of their adaptation to forget their dreams.

My hypothesis may be difficult to test in an evolution-historical setting, but there could be found convincing evidence in favor of it. First of all, there may be cases of people who continue to recall their dream contents as vividly as the contents of their waking experiences without being able to discern the difference between these two kinds of memories. In such cases, it should be easy to observe the difficulties those people encounter in their lives because of that disability. (Such people would be apt to be regarded by the medical science as people with a handicap or even abnormality, rather than as people having an interesting and harmless gift.²)

² In the blog where I posted an earlier version of the present paper, a commentator recounted her amazing ability to recall her dreams and its impact on her life:

I have always had vivid and memorable dreams, to the point where 4/7 nights a week I wake up and can relate in detail my dreams to my husband (who marvels at them both due to their detail, their content, and the fact that he rarely dreams or remember any of his dreams...). ... I can still describe in minute detail some of the dreams I had as a child, particularly recurring nightmares. While my memories of these dreams are reinforced by revisiting them, the same is true of my memories of reality; in fact, I'd say that up to a certain age, my memories of reality and my memories of dreams are probably about equal in number and strength.

... I have had dreams ... that have had a profound impact on my life and my attitudes/behavior towards other people, even though I know that they are dreams. Before my husband and I were [not] officially dating, but were on the way to it, I once dreamt that he'd invited me out to lunch because he wanted to introduce me to someone very important to him, and it turned out to be his (nonexistent in real life) girl friend from back home and 3 year old daughter. I knew it was a dream, but it was so vivid, and I was so hurt by it, that it took me most of the weekend before I could "forgive" him. (It still raises some ire whenever I remember it!). I have also had other dreams which, for whatever reason, fundamentally changed the way that I viewed another person; such dreams have affected my interactions with these people in long term ways even though I have never divulged the details to anyone.

Secondly, the unethical alternative: suppose we have the technology to perform alterations in the brains of people to endow them with the trait of having good memories of their dreams. Even better (and more unethically), do it by forging appropriate mutations on some people's genes, so that they can pass that trait on to their next generations. Then sit back and watch if the lives of their offspring will become a hell or not—in other words, see if their chances of survival will improve or deteriorate. But proviso: Don't make such changes in a way that the brains of the persons can tag their dream memories as "happened in dream," thus enabling them to distinguish reality from dream and not conflate the two. These are only thought experiments for now, but they should suffice to establish that my hypothesis does pass the test of (in-principle) testability.

III. Do Dreams Entirely Vanish from Memory?

But are almost all of our dreams really wiped out from our memory for good? This may not be the case, at least for a number of dreams. For one thing, we can sometimes tell that some of our dreams are recurrent dreams. Our realization that some of our dreams recur shows that we are able to remember their repeated occurrences in the past. If we had forgotten our dreams entirely, we wouldn't have been able to notice that some of them recur. Hence, for at least some of our dreams it may not be true that they become totally inaccessible to our consciousness. Nevertheless, the majority of them must become inaccessible enough to ensure that we won't mistake them for waking experiences.

There are other cases that suggest that just because dreams are not remembered immediately after waking up does not mean they are necessarily erased. Sometimes a visual or auditory cue from the environment during the day triggers our recalling of (a portion of) a recent dream which we had totally forgotten.

There are still other cases supporting the point that dream forgetfulness is not always swift and total. When they are falling asleep, some people occasionally experience faint flashes of bits from the previous night's dreams.³

(Retrieved on December 10, 2014 from <http://hesperusisbosphorus.wordpress.com/2012/04/01/i-have-a-dream-but-i-cant-remember-it/>. I would like to thank this commentator and the other commentators for their useful comments to my post.) This story contains the clues that remembering our dreams can be a handicap. We can even imagine situations in which it can be life threatening. But the commentator is lucky in that her memory *does tell her* it happened in dream, not in reality. That is, her brain apparently differentiates her memories by tagging them as "in dream" or "in reality." Hence she is not the kind of pathological case that I mentioned above. In her case, since she can discriminate between the memory of a dream and the memory of a waking experience, she has the chance to avoid (though with some difficulty apparently) the negative effects of her deceitful dreams. (Other cases of people who confuse dream and waking memories and some of their associated problems are studied in Rassin et al., 2001 and Kemp et al., 2003, for example.)

³ For reports of people having this kind of experience, see the blog thread at <http://ask.metafilter.com/48026/Dream-a-little-dream> (retrieved on December 10, 2014).

Even if it is the case that *some* contents of *some* of our dreams get stored in our memory, typically those contents are not readily and easily accessible to our consciousness, unlike memories of our waking experiences.⁴ My point remains, therefore, that if we hadn't evolved in this way, our cognitive system would have been prone to confuse dreams with non-dream reality, and we would have suffered the consequences of such confusion. The relatively few dreams that we do recall, either by conscious effort to remember them (e.g. by recording them in a dream journal) or otherwise, normally come with the "happened in dream" tag, enabling us to distinguish them from and waking memories.

IV. Might Dreams Be Serving No Purpose for Us?

Another issue regarding dreams is what purpose, if any, dreams serve. There are a number of theories purporting to explain why we dream and what use and function dreams have for us. According to the Freudian theory, for example, dreams are means by which our subconscious desires and thoughts and repressed feelings find their way into our consciousness. Some of the other theories suggest that dreams are for memory consolidation or memory stabilization (turning worth-to-keep short-term memories into long-term memories), or for emotional or trauma consolidation (helping secure emotional well-being for us). Still others claim that dreams help us come up with solutions to some problems (such as mathematical, scientific, artistic, etc. problems) which we can't solve in waking life, or that they are cleaning-up operations of the daily thrash piled up in the mind (analogous to the cleaning-up operations of a computer), or that they are simulations of threatening situations to be encountered in waking life (so we will be better prepared for such situations), and so on.

All of these theories about dreams maintain that dreams serve useful functions and at least tacitly imply that dreams must have survival value for us. But there are also theorists who defend the opposite view. They argue that dreams are nothing more than side-products of certain brain processes taking place when we are asleep and that they serve no useful functions. Owen Flanagan, the best-known representative of this position, contends that dreams are "noises" the brain produces while it carries out its operations during REM sleep—like the noises our heart makes while it pumps blood—and they have no adaptive value for us from an evolutionary point of view:

... dreams are evolutionary epiphenomena. Evolutionary epiphenomenalism ... says that the presence of dream consciousness has no adaptation explanation—there is no fitness enhancing effect for which dream consciousness was selected.... (2000, pp.100-101)

According to dream researchers Antti Revonsuo and Katja Valli, evolutionary epiphenomenalism is a widespread view among a class of dream theorists:

Practically all theories put forward in cognitive neuroscience imply that dreaming is biologically epiphenomenal (e.g. Hobson 1988; Crick and Mitchinson 1983, 1995; Foulkes 1985; Antrobus 1993; Flanagan, 1995). Dreaming is seen by these theorists as a mere reflection of low-level neurobiological or neurocognitive processes going on in the brain during REM sleep. Thus, the

⁴ In other words, those dream fragments are put in some kind of "deep storage" in the memory. An intriguing question would be whether we can recall our dreams, even those we had had long time ago, under hypnosis. One big obstacle that would stand in the way of such a feat would be the problem of false memories: the hypnotization procedure might lead to fabrications on the part of the hypnotized subjects, instead of recollections of true memories of their dreams.

received view in cognitive neuroscience is that dreaming as a conscious experience has no natural functions and it has not been selected for during evolution. It is simply a random and useless (but harmless) by-product of the neurophysiological processes associated with REM-sleep. (Revonsuo and Valli, 2000)

Now I want to argue that evolutionary epiphenomenalism about dreams is probably mistaken. It seems to me that dreams may well be serving functions that increase the survival chances of the dreamer. One consideration in favor of the idea that dreams must have functionality is that, as I pointed out in section III, at least some of our past dreams, and at least some bits and pieces of them, don't seem to vanish from our minds definitively—even though they tend to remain latent and we cannot bring them out to consciousness effortlessly. If dreams are just useless noises, why are at least some traces of them stored for some time in our memory? Wouldn't it be less costly for our cognitive system to erase them entirely and for good? As we have seen, our brain is perfectly capable of making us forget our dreams fast after we wake up. Why shouldn't it also be capable of making us forget them without leaving any deep-stored traces of them?

A second consideration is this. Why do dreams or dream segments exhibit more or less coherent plots, as opposed to being a *totally chaotic flux* of visual, auditory, etc. pieces of *sensa*? If our dreams *were* such meaningless phantasmagoria (looking somewhat like a display of fireworks accompanied by meaningless sounds, say), perhaps Flanagan's and others' epiphenomenalism would have more bite. Flanagan seems to endorse the following view about how dreams arise: When during REM sleep the brainstem produces electric pulses relaying a chaotic flow of imagery, emotions, and desires to the cerebral cortex, the cerebral cortex tries to make sense of this messy input by molding it into semicoherent narratives (p.50).⁵ But why does the cerebral cortex bother and waste the precious brain energy and resources to shape them into a somewhat coherent story, if they are nothing but useless by-products?

Thirdly, we know that during REM sleep dreams are intensified. It is possible that the dreamer start reacting bodily to the drama being staged in her dream. For example, the dreamer may move her limbs violently in response to the exciting or provoking events taking place in her dream. This could cause harm to herself and others or, at the least, would awake her. To prevent this undesirable situation, the dreamer's relevant muscles are paralyzed (atonia) by the body chemistry, as soon as a REM sleep begins. Now, this seems to be a rather uneconomical solution to the problem, if dreams are just useless side-products of the brain's workings, as Flanagan claims. Instead of going through such a paralysis procedure, couldn't our brain follow another strategy: annihilate all the dreams before they surface to our consciousness? But, interestingly, dreams are not stamped out by the brain; they are allowed to be experienced by us, albeit in a paralyzed state.

My fourth point is probably a familiar phenomenon to all of us. If you have ever felt thirsty, hungry or in need to go to the bathroom during a dream, you know what happens: you are dreaming of yourself as drinking plenty of water, or consuming some food, or trying to satisfy your urge to urinate in some dream scenario (instead of wetting your bed). Of course, after a while you wake up without your needs really satisfied, but at least your sleep wasn't immediately interrupted by such needs, and could continue for a little longer. This prolongation of your sleep is an advantage made possible by dreaming. Another example of a similar sort is the dreams of people who are struggling to quit smoking. They get a little relief by taking a

⁵ For the original statement of this view, see Hobson and McCarley (1977, p.1347).

puff in their dreams. If dreams clearly serve functions in these kinds of circumstances, why shouldn't they serve functions in all, or at least many, other circumstances too?

For all these reasons, I think it is plausible to suppose that dreams are not merely unimportant by-products of certain brain processes. More probably than not, they serve some functions and that is why we are adapted to have them. I do not know what exactly those functions are. They may include some or all of the functions that the dream theories mentioned in the opening paragraph of this section—and some not mentioned there—point out.

V. Conclusions

Let me recapitulate what I have done in this paper. I argued that a reasonable evolutionary explanation of our dream amnesia is that it is an adaptation to keep us from mixing up our dreams with real life (section I). This is a difficult hypothesis to test scientifically, but it is possible to corroborate it in principle (section II). We normally remember the contents of our dreams only for a brief period of time, if at all, after waking up,⁶ but there are clues that there occurs long-term storage in our memory of portions of at least some of our dreams (section III). I use this and some other properties of dreams to argue against the evolutionary epiphenomenalist thesis that dreams are not adaptations but are biological epiphenomena (section IV).

Let me note that my point in section I is independent of my criticism of Flanagan's epiphenomenalism. Even if dreams are, as Flanagan thinks, noises the brain produces during sleep, the brain has two options: remember them or forget them. Our brain chooses to forget them (or more correctly put: makes it much harder for us to recall them than our waking experiences) in order to protect us from the perils of conflating dreams with reality.

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⁶ We remember a dream upon waking up only if we woke up in the middle of or immediately after it. If the dream episode had ended before we woke up, we don't remember any of it.

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