

## WEEK 4 ANSWER TO QUESTION 1

### STEP 4.7 ASK MARK

Hello. So it's time to answer questions again, this time questions arising out of Week 4 of the course. And that's the week in which we focused mainly on intentionality.

Question 1. I too am fascinated by dreams and would like to know what Mark has to say about the Jungian belief that dream images are frequently images generated by the unconscious for conscious processing.

The first thing to say is that that's not an exclusively Jungian belief. In fact, it's quite a general belief, certainly amongst psychoanalysts of all persuasions. But beyond psychoanalysis, and perhaps even within psychoanalysis today, there is not much consensus about dreams. So I'll speak to what are incontrovertible facts. And then I'll say something about the major theories that are current today. They sort of overlap with each other, as you'll see.

What's incontrovertible-- and I'm especially emphasising this part because I myself have done quite a bit of research on brain mechanisms of dreaming, it's an area of special interest of mine-- we used to think that dreams happen during REM sleep and that therefore the brain mechanisms for generating REM sleep are the mechanisms for generating dreams. What is incontrovertible is that that's incorrect. It is now definitively proven that dreams occur quite frequently. In fact, about a quarter of our dreams occur outside of REM sleep.

And secondly, that the brain mechanisms that generate REM sleep are not the brain mechanisms that generate dreams. Even in REM sleep it's not accurate to portray the brain mechanisms of REM as the same thing as the brain mechanisms of dreaming. They co-occur. They correlate. But they're not the same thing.

And how we discovered that, this last thing I'm talking about, is that we found large numbers of patients who have damage to a part of the brain which leads to a cessation of dreaming, a loss of dreaming, but REM sleep persists in those patients. Conversely, or by the same token, we found patients who have damage to the part of the brain that generates REM sleep, in fact who have no REM sleep, and yet dreaming persists in those patients.

That means they're doubly dissociable. There's a part of the brain that's critical for dreaming but not for REM sleep. There's another part of the brain that's critical to REM sleep but not for dreaming. That means they can't be the same thing.

So the part of the brain that turns out to be critical for dreaming, in fact there are two parts. The first is the parieto-occipital junction on either side of the brain. And this part of the brain is responsible for visio-spatial cognition, for mental imagery if you will, the sort of imaginary space. As you can imagine, if you'll excuse the pun, if you can't visually spatially imagine things, then you can't dream, because that's what dreams are. So that's not really that surprising and not that interesting.

Much more surprising and interesting is the other part of the brain which is crucial for generating dreams. And that is the mesocortical mesolimbic dopamine system, also known as the seeking system, also known as the wanting system, also slightly misnamed as the brain reward system. This part of the brain is highly active. It's not only that we've shown that damage to that part of the brain leads to a loss of dreaming, we've also shown that during dreaming sleep if you scan the sleeper's brain, during dreaming sleep that system is switched on like a Christmas tree.

What's interesting about that is that this part of the brain generates motivated behaviour. It's in fact the single biggest motivator of action of all mammals. And yet this thing is switched on when you're fast asleep, so it's kind of a paradox. How can it be that this part of the brain which makes you do things is so highly activated at the one part, in the one phase of the day where you literally can't do anything, because you're asleep?

This has led to the first of the-- so all of what I'd said so far is incontrovertible. Now I'm moving into theory. And as I said at the outset, there's no consensus in regard to the theoretical question of why do we dream. And I'm coming to this question about the unconscious generating dream thoughts for conscious processing. It's a variant of the question, why do we dream? What's happening in the brain when you're dreaming? And what psychological work is doing?

The first theory, and this is one that I myself subscribe to, arises from the facts that I've just told you, namely that there's this paradox that during sleep, when you are in a state of rest and more in a state of great inactivity, the part of your brain that motivates you to do things in the world is switched on sort of full-blast. That gives rise to the view that dreams are a sort of alternative to real motivated action in the external world, that the imaginary virtual world of the dream sort of diverts your motivational intentions away from the outside world into this I'm saying virtual, I could also say hallucinatory, delusional world of the dream. And that's a kind of commonsensical theory, I would think, that dreamed motivated activity happens instead of real motivated activity.

But it's one step further to say that this is the function of dreams. The function of dreams is to keep us asleep. It enables you to not have to really do things, because you delude yourself that you're doing things in the mental space, the imaginary, hallucinatory world of the dream.

Now that's a theory. If it's a scientific theory, it has to be testable, which means it has to give rise to predictions and those predictions have to be falsifiable. And this is the beauty of brain science. In dream science prior to the current era, where we have all of these wonderful tools in neuroscience, there were all sorts of speculative theories and nobody was able to test them. In fact Carl Popper famously said that psychoanalysis was a pseudoscience. He used it as an example of something that looks like a science which isn't really a science on precisely these grounds, that it doesn't give rise to falsifiable predictions.

Well, this is now a falsifiable prediction, that if it's true that dreams occur in order to keep us asleep, in other words in order to delude us and to trick us into believing that we are doing the things that this motivational system is driving us to do during sleep, then patients with parieto-occipital lesions who are not able to generate the mental imagery of a dream but who still have this seeking system, this motivating dopamine system intact, then when you get the dopamine surge that would normally lead to a dream, but can't because of the damage to the mental imagery parts of the brain, then you should wake up. That's the prediction. So people with damage to the parieto-occipital junction who don't dream should have poor quality sleep. And in fact, that's a study we're busy doing right now.

Another current theory about the function of dreams is that in our dreams, we are processing the events of the day and encoding them in connection with existing memory material, so that what happens during dreams is that the events of the day are activated, the memories of the events of the day are activated, alongside the activation of long term previous memories so that the encoding process can select what should be remembered and what should be discarded from the dream day, and equally importantly how and where should this new material be encoded. What does it mean, which is another way of saying, what is it related to from my previous experience? How do I connect this up with everything else that I know and do?

So I'm putting in very sort of colloquial terms the theory that dreams serve a memory encoding and memory consolidating function. And in fact, there's a whole lot of different aspects of memory, as many of you will know. And it seems to be particularly fashionable at the moment the idea that emotionally salient events of the previous day or the previous two days, in fact, are particularly the kinds of memories that are encoded and consolidated during dreaming.

So there too we now have an opportunity to test this theory, using the same patients as I spoke about earlier. The patients who are unable to generate dream images, if dreams perform an important emotionally salient memory consolidating function, then these patients should be defective in their capacity to encode such memories. So this is another study that in fact we are busy doing right now to decide between these competing hypotheses.

And indeed they may not be competing. It's not necessarily the case that dreams do only one thing. Many things in biology evolve because they serve one useful purpose. If they

happened at the same time to serve another useful purpose, then all the more reason for them to be selected in.

They're not designed to perform a particular purpose. They just happen. And then it turns out that they enhance survival and reproductive fitness. And if they do so in two or three or four ways, then all the more reason for that polymorphism to be retained in the genome.

Now the question about unconscious-- the unconscious generating material for conscious processing in dreams, let me put it into the framework that I've outlined. The seeking system, this dopamine system that I've emphasised so much, it serves two main purposes-- or it works in two major ways, let me say it that way, rather. The one is that there are need detectors-- as we now all know from this course, there are need detectors in the hypothalamus and elsewhere in the brain stem which are monitoring the internal milieu, the state of the vital needs of the body.

And for obvious reasons, these mechanisms can't switch off during sleep, I mean, these are vital functions. When you're asleep just as much as when you're awake you need to keep your body within the parameters that are compatible with life. And so these need detectors activate upper brain stem systems which in turn are connected to instinctual behaviours which lead us into the outside world, because that's the only place where your needs can be met.

So it's no surprise that the seeking system is activated during sleep, because as I say you have to stay alive even during sleep. And how do you stay alive? You can't auto-regulate your bodily economy. Your bodily economy is making demands upon the mind to perform work in the world, because the world is where your bodily needs can be met.

So you have this paradox built into the brain that there are motives, there are volitional urges to do things even when you're asleep. And this has to be balanced against the need for sleep, which is another one of our vital needs. But what I'm saying, what I'm emphasising now is that this is one of the things that activates the seeking system from below is needs, bodily needs.

But it's not the only way in which the seeking system can be activated. And you'll know this from your experience. You can also-- motivational interests can be attracted by something that happens in the outside world. So an important event occurs outside of you, regardless of your need state, and this attracts your motivational interest. You become drawn into an external event.

These external events are also internalised in our memory systems. And so we have cognitive events which are representations of external events, we have thoughts, we have memories, that these things can also draw motivational interest. And so what I'm saying is that although the seeking system seems to be the pivotal mechanism for generating dreams, it can be activated from below and it can be activated from above.

When we speak of unconscious thoughts generating dreams, then we're speaking about dreams being activated from above, because thoughts, representations, cognitions, whether they're conscious or unconscious, are cortico-thalamic things. They're not lower brain stem things.

So all of this leads me to say the following. I don't think that the unconscious thoughts are themselves the only or even the main motivator of dreams. I think the main motivator of dreams is the activation of the seeking system, which is in itself without representations. And the seeking system then attaches to these representations. But it is true that representations can also draw the interest of the seeking system. But I think the main generator of the dreams we have to say is the seeking system, is the motivational urge, the curiosity, interest foraging sort of system which I've described this week.

There's a lot else that could be said about dreams. And there are a lot of other theories about dreams. I've just emphasised the two main ones. But perhaps I could just sum this discussion up by making this simple, sort of formulaic statement, that emotions are problems. We have feelings because they're telling us there's something happening that needs mental attention, that's, as I put it earlier, a demand upon the mind to perform work.

Demands are made upon the mind to perform work, whether you're awake or asleep. And dreams are the attempt to find solutions. It's the mental work that we're doing to solve the problems that arise while we're asleep. I think that's a kind of neat and elegant, I hope, way of summarising what brain science is telling us about dreams today. And I hope-- where these unconscious thoughts fit into that bigger picture, I hope that I've been able to be clear about that.



Mark Solms 2015

This material is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).