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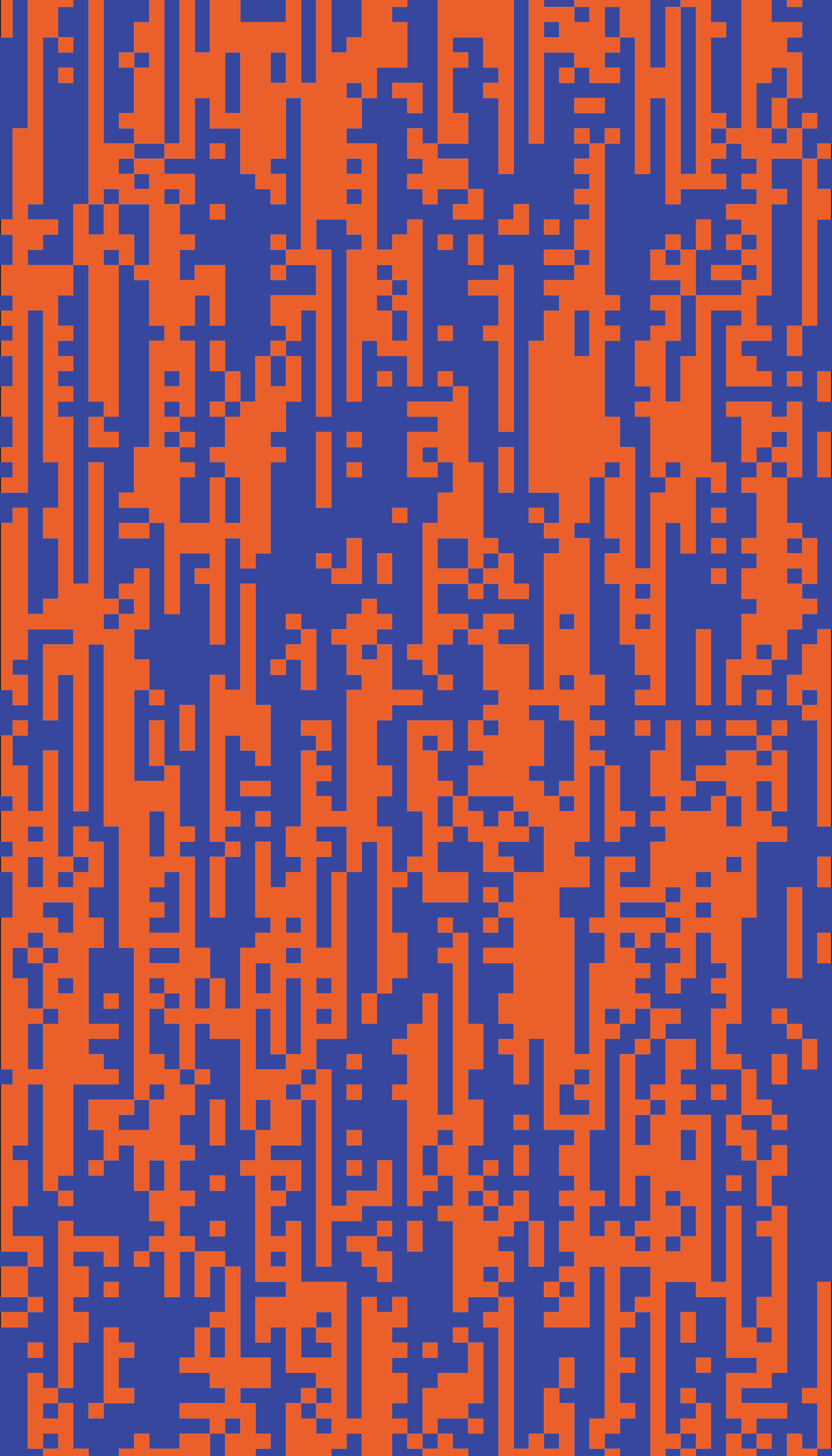

The Tetris Effect: How We Learnt to Manipulate Dreams

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Podcast By Sana Qadar

Sana Qadar: What do you think about as you're trying to fall asleep? In those moments when you're transitioning from consciousness to unconsciousness? Because when I turn out the lights and my head hits the pillow, I immediately start thinking about all the stuff that's stressing me out.

Robert Stickgold: **It could be something you were supposed to finish and you didn't, something that you gotta do tomorrow that you're not sure you're totally prepped for. That's what you tend to mull over in your mind.**

Because this phenomenon isn't really about the video game.

SQ: But the other day, producer Shelby Traynor had me do an experiment where instead of thinking about all the usual stressful things, I had to play Tetris. And I wasn't allowed to know why.

Shelby Traynor: It was an experiment. I didn't want to tamper with the results.

SQ: Right. And so you asked me to play Tetris in the morning and just before going to bed.

ST: And you weren't the only one. We actually recruited the rest of the science unit to do this as well.

Rose: **This morning I opened Tetris for the first time and played it for about 10 or 15 minutes. And first of all, it reminded me of how bad I am at Tetris. And the other thing I noticed was how quickly I got very sucked into the game.**

Peter: **Played another couple of hours yesterday, getting into it, trying to get over 500,000 for a score, not doing too well at that.**

Jacinta: **This is day three of me playing Tetris. I am not very good. I mean, I'm fine, I guess. I would give myself like a four out of 10.**

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of time

doing a task.

SQ: Yeah, I'd probably give myself the same score too. I wasn't very good.

ST: I just love how self-deprecating everybody in the science unit is. It really fits the vibe.

SQ: Totally. And so why were you asking us to do this? Am I allowed to know now?

ST: I was trying to mimic an experiment that real scientists did a couple of decades ago and trying to see if I could get our colleagues to dream about Tetris.

SQ: This is All in the Mind. I'm Sana Qadar. Last week, Shelby looked into how video games like Tetris can be used to process trauma. This week, she's making us dream about Tetris.

R: As I was falling asleep, thoughts of Tetris entered my mind. That is how I know I've potentially played too much Tetris.

P: Sort of saw shapes just before I went to bed, but not sure if that's just because I got up too fast after playing way too much Tetris and being very, very tired.

J: I play a lot of video games. Not usually Tetris, usually other things. And I've had dreams about the games I'm playing.

R: It was interesting that one of the last things my thoughts drifted to before I fell asleep was Tetris. Tetris as well and truly embedded itself in my brain now.

ST: So Sana, did you have any Tetris dreams?

SQ: Do you know what? I didn't. I'm sorry. Did I fail?

ST: Well, you know, the whole episode just hinges on you having Tetris dreams. So, thanks.

SQ: Oh God, oh no.

ST: While Sana hasn't experienced Tetris dreams, I'm willing to guess she has experienced the Tetris effect before. Because this phenomenon isn't really about the video game. It's something that happens when you spend a lot of time doing a task. And it goes on to shape the way you think about things, visualize things and how you dream. The only reason the Tetris effect is called the Tetris effect is because of psychiatrist Robert Stickgold. And it all started with a family holiday.

RS: I was up in Vermont with my family. And we went and climbed a mountain called Camel's Hump. I go to bed that night and as I'm falling asleep I realise I can feel my hands on the rocks again and I feel myself being back there again. It startles me and I sort of come slowly awake, and say, that's really weird, I wonder if I can do it again. And I sort of let myself drift back to sleep and as I'm falling asleep it happens a second time. And being a scientist I said, that's really strange.

ST: Professor Stickgold is a sleep researcher at Harvard Medical School. So, he wanted to investigate.

RS: And I came back and I was annoyed because I'm not going to be able to get some IRB committee to approve a study where I take students climbing up mountains.

ST: Those are the committees that make sure experiments are ethical and safe. So, important stuff.

RS: I was pissing and moaning about this to a group of students, and one of them says, well, what about Tetris? And I say, what? And another student says, yeah, Tetris. And they told me, oh, when you first start playing Tetris, as you're falling asleep at night, you see all these Tetris pieces falling.

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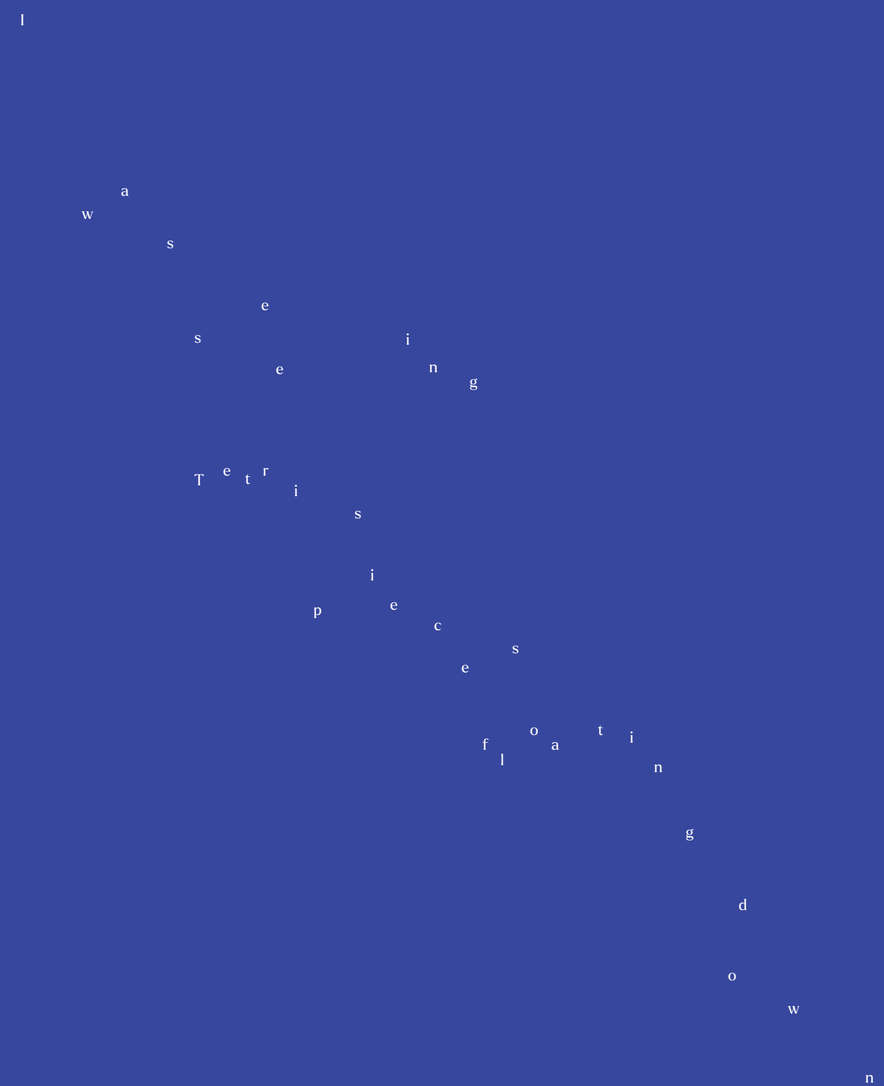


ST: This was happening during what's known as hypnagogia, the transition between wakefulness and sleep. It's common to see images, maybe even hear things during this phase. Professor Stickgold refers to them as sleep-onset dreams, but they're also referred to as hallucinations because they are different from dreams that happen during REM sleep.

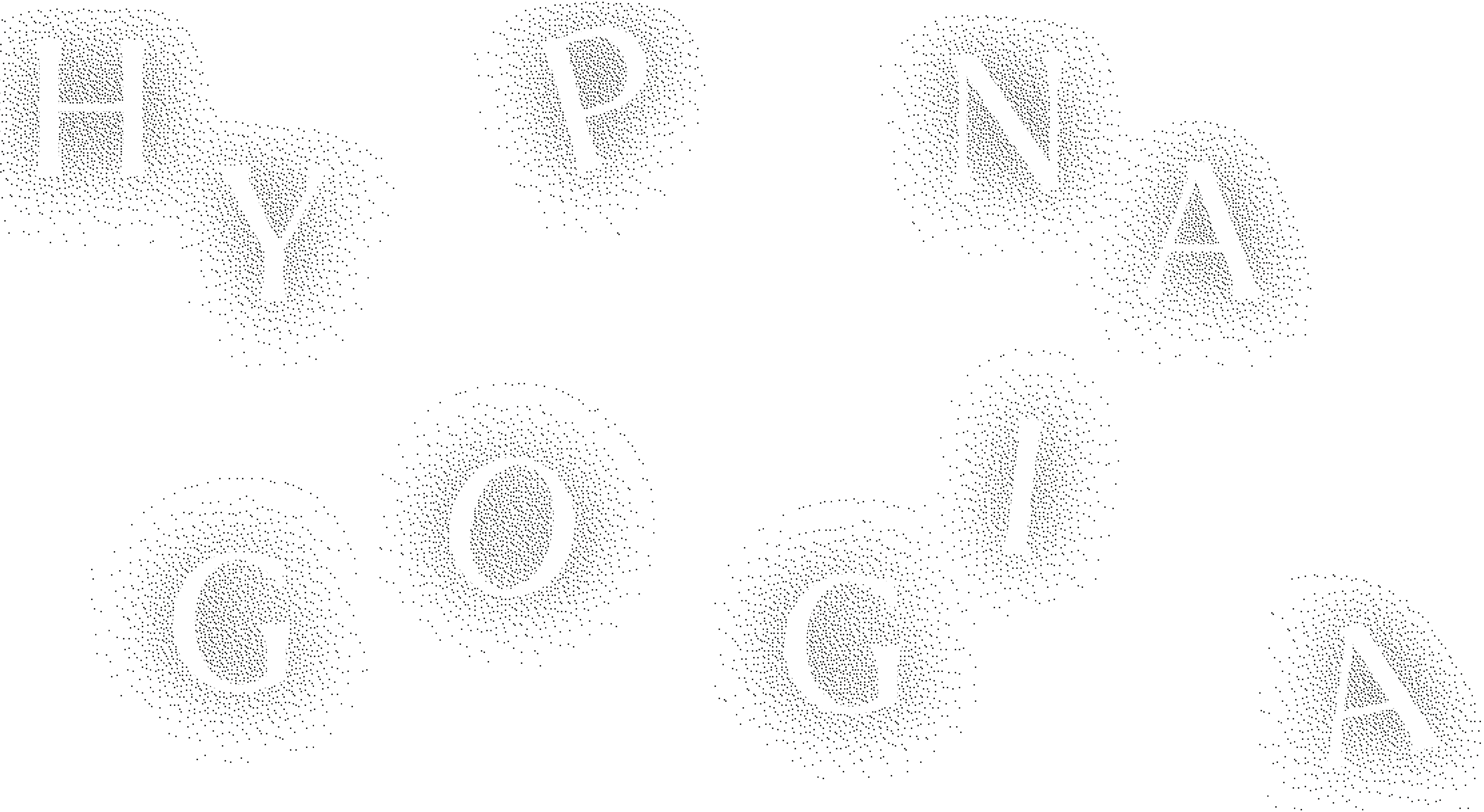
RS: They're different in that they will often be very clearly and directly related to what was going on before you fall asleep.

ST: Dreams that happen during later stages of sleep are much more abstract than hypnagogic hallucinations, which tend to be literal and less emotional.

RS: So, these were Tetris images. I wasn't seeing milk cartons being put into the refrigerator.

ST: And there's another distinction.

RS: 85, 90% of our dreams, we are present as a character in the action, and there's an action going on. Sleep-onset dreams, you just see things. You might just see faces, you might just see a landscape, you might just see Tetris pieces floating down, but you don't see yourself playing Tetris.


HYPNAGOGIA

ST: What interested Professor Stickgold most was the apparent control you have over what you dream at the onset of sleep and the function this might go on to have. After all, sleep is an important time for problem-solving and making sense of things. It might not be a coincidence that so many of us think about what's next on our to-do list, as we're drifting off. So first, he devised an experiment to find out how easy it really is to make people dream of Tetris.

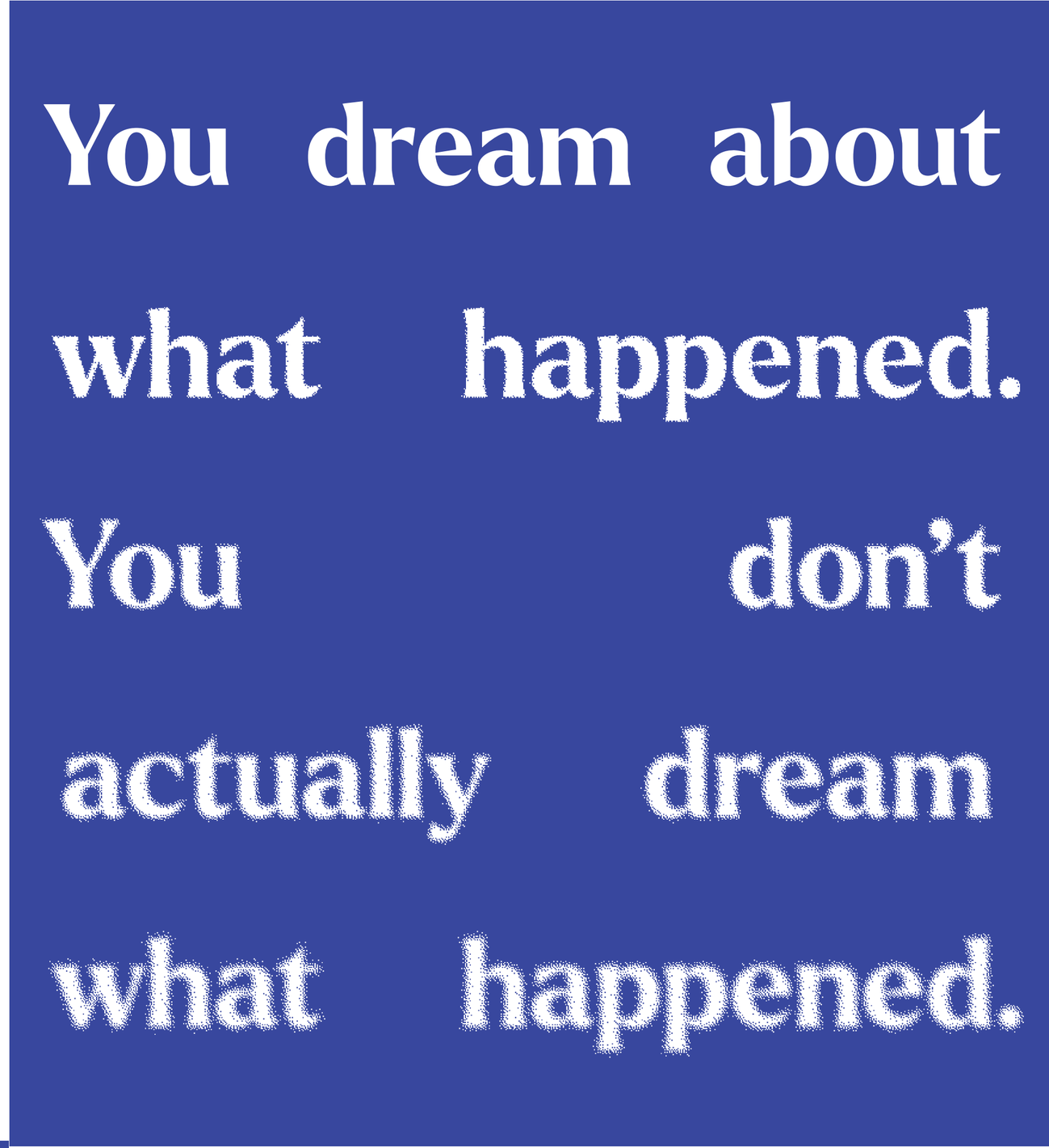
RS: So we set up to do it, have novices and people who had played a lot before play a couple of hours of Tetris before they go to bed, wake them up repeatedly, as I did with myself in Vermont, and collect dream reports and see what we get.

ST: More than half, about 60%, reported Tetris dreams. They did not see themselves using the mouse or the keyboard and only a few saw the computer screen at all. It was mostly Tetris pieces rotating and falling.

RS: So that was the basic study, and then a funny thing happened.

ST: Professor Stickgold and his colleagues decided to redo the experiment, but this time with participants who had amnesia. The three people had damage to a part of the brain that's critical for the formation, consolidation and retrieval of new memories. And so you would assume they wouldn't experience this sleep onset Tetris effect, but that wasn't the case.

RS: I mean, I can remember when John called me and he said, Bob, we got one. And he reads me this report from an amnestic patient. It says, I was seeing shapes floating down. I wish I could remember what it was from. Without having any consciously recallable memory of having played the game, they were still creating dreams from some inaccessible memories that must have been formed. I mean, we were seeing through these dreams, information that these people had stored in their non-conscious minds that they had no conscious access to.



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ST: This goes to the very nature of dreams themselves.

RS: What it says with the amnesics is that the part of the brain that they used in constructing their dreams, first of all, is obviously not the hippocampus because the hippocampus has pretty much been destroyed in these people. And when we recall memories, most of us, normal people, healthy people, we do it through the hippocampus. So in constructing these dreams, they're not using that path. And since they're having these Tetris dreams really for all practical purposes at the same exact rate as normal healthy people, then healthy people probably aren't using their hippocampus either. And that makes sense because people don't replay memories in their dreams. They don't take the memories that you can recall from your hippocampus and play them in their dreams. You dream about what happened. You don't actually dream what happened.

ST: They came to the conclusion that these sleep onset dreams probably arise not from the hippocampus, but from the neocortex. As someone who has been researching memory consolidation in sleep for many years, this was an important finding for Professor Stickgold. But for the rest of us, what's more important is the very idea that you can influence dreams at all.

RS: Oh my goodness, we can experimentally manipulate dream content. Instead of spending the last hundred years just looking at people's dreams and wondering about them, we can actually do experiments. I mean, it's the same as putting the bean plants in the closet and watching how those grow tall and white. Something we did changed the dreaming in a person's brain mind. And so now we can manipulate that, we can say, okay, well, how can we manipulate it? What can we get in?

SQ: That is amazing. I'm trying to think about what I would manipulate my dreams to be about.

ST: The options are actually endless. Like you could be more productive, you could learn a language, you could try to come up with some fun story ideas.

SQ: I don't wanna be productive in my dreams. I wanna have fun in my dreams.

ST: You can see that being co-opted by work, can't you?

SQ: Definitely. Okay, but is there any evidence that any of that is actually possible?

ST: Well, see, Professor Stickgold's first Tetris study, that happened way back in 2000. There's been decades to do further experiments. And there's a new generation of researchers working on just this.

Adam Haar: My name's Adam Haar. I am a dream scientist. I got into it through a kind of circuitous path. I got really interested in this idea that we had multiple voices, all of us, in our head, and that the way that we tell a story about the world forms our perception in really important ways. And got really interested in the way that dreams form part of the kind of predictive aspect of perception, that our dreams help form our expectations, help make sense of our yesterdays.

ST: Dr. Haar Horowitz has worked with Professor Stickgold and many others on what he calls targeted dream incubation. He didn't know it until he started doing this work, but he'd taken part in dream incubation at an early age.

AH: I, when I was a kid, had a mugging incident in New York and had these repetitive dreams of that incident occurring again and again, and my mom would just sit by my bed and whisper in my ear as I was falling asleep and suggest different and easier and more magical dreams to me than the replay of this difficult incident. It worked so well that I forgot a lot of my nightmare experience, and it only came back to me when later in graduate school, while getting my PhD, I was interested in changing the course of people's dreams, and I started playing this very quiet audio while they were in drowsiness or hypnagogia, the first stage of sleep, and I chose, and I can't tell you why, this dream theme, which was a rabbit. I chose to have people think of a rabbit or dream of a rabbit with that audio, and I told my mom what I was doing, and she said, that's exactly what I used to do with you, is dream of a rabbit, think of a rabbit. I think it lodged somewhere pretty deep in me, so deep that I forgot and then remembered.

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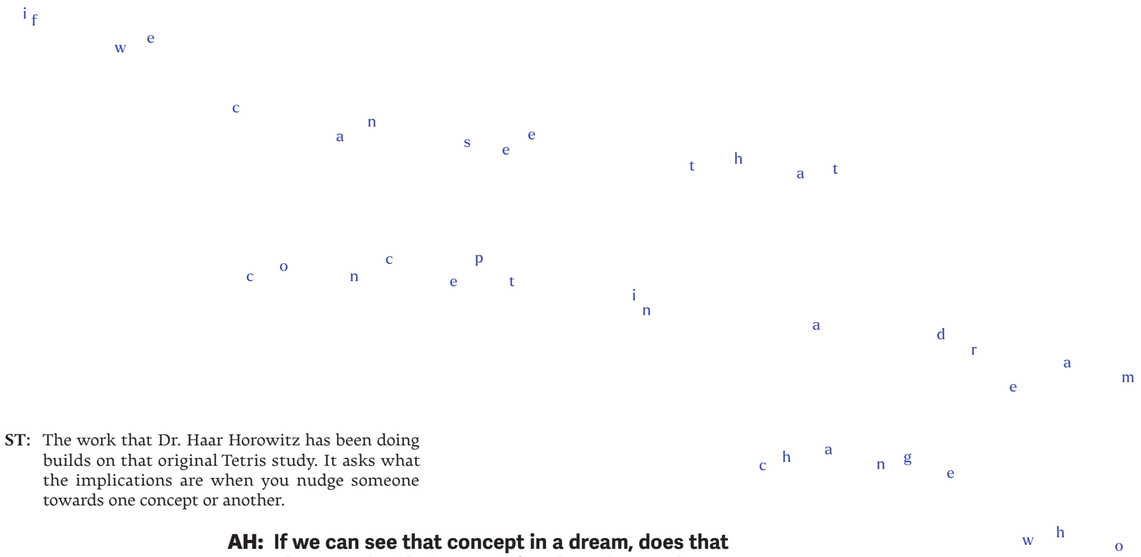

ST: The work that Dr. Haar Horowitz has been doing builds on that original Tetris study. It asks what the implications are when you nudge someone towards one concept or another.

AH: If we can see that concept in a dream, does that change who that person is when they wake up, the way they think or process?

ST: If you're wondering how you can control your dreams, Adam has honed a technique to improve the chances of the suggested concept taking hold.

AH: It looks for a state of consciousness in between full wakefulness and full sleep, at the later stages of the loss of consciousness when you're first lying down, it looks for a moment where you're still hearing the environment around you, but already you've started to have small dreams.

ST: And in one of the studies testing out this technique, the concept was a tree.

AH: At that moment, a device which is tracking that sleep stage says the words out loud, think of a tree. And then it leaves you alone for a little while as you slip into stage two sleep. And before you go too deep into sleep, it wakes you up very gently using sound again and asks you for a dream report. Tell me what you're thinking about. And then it reminds you of the dream theme. Remember to think of a tree. Lets you fall back asleep in repeat. We found that those sounds, little simple words, think of a tree, think of a rabbit, would really reliably, over the course now of many studies, about 92% on average, reliably make people dream of a specific theme that we'd chosen.

RS: That's what's most stunning to me about Adam's study. You know, he says, think about a tree. Let yourself fall asleep. I mean, who the hell is gonna dream about a tree, right? I mean, there's nothing about a tree that's gonna catch people and make them want to dream about it. There's no emotional connection to it. But if you're just thinking about it as you fall asleep, you'll dream about it.

ST: Whereas Professor Stickgold was asking people to dream about a video game, Dr. Haar Horowitz was asking people to dream of a concept. These concepts were open to interpretation and so the dream reports were much more varied.

AH: The theme becomes a kind of platform or a paintbrush to build the world of the dream with. So a dream of a tree could be a dream in which one is meeting with one's PhD advisor and turning into wood because they're so nervous and becoming a tree stuck to the ground. Or it could be a dream of following roots, physical roots, down into one's memories, which are each these cavernous rooms in the soil at the end of root tips. Or a dream of a rabbit could be, I remember someone became a rabbit floating on a macaroni piece, moving away from home on a wide ocean.

ST: But the point of this research wasn't just to show that incubating specific dreams was possible. It was to find out whether these sleep-onset dreams had lasting impact on the waking mind. Creativity seems like an obvious place to start. After all, dreaming has been linked to artistic pursuits.

AH: There's so many years of anecdotal reports from John Lennon or Salvador Dali or Sylvia Plath on dreams being this font of creative imagination, but there haven't been tools which help people harness in particular ways, the kind of dreamscape and shift it into the one that they want for their particular creative challenge.

ST: The research Dr. Haar Horowitz has done suggests that the first stage of sleep, the moment you fall into unconsciousness may be a creative sweet spot.

AH: We were looking at if we stimulated these dreams of trees, these people would be more creative on tests related to trees than folks who had different dreams that we did not incubate.

ST: 50 people were recruited for this dream experiment and they were split into four groups. Group one was told to dream of trees, group two wasn't. Group three stayed awake and thought about trees while group four stayed awake and thought about whatever they wanted. When their time was up, everyone was asked to undergo a creativity task about trees. And it was group one, the incubated dreamers, who came out on top.

AH: If you have not only a dream of a tree, but if you have more dreams of trees than the other people who are asleep dreaming of trees, then you're more creative. So each additional tree dream seems to have a creative benefit.

ST: Dream incubation may go beyond creativity. Sleep is a really important time for our minds and our bodies. It can determine whether we have a good day, week, life, it affects everything we do. And so the ability to influence what we think of as we sleep could have endless applications.

AH: We know that your dream content is correlated with how quickly you learn a foreign language. We know that your dream content predicts depressive symptoms, is correlated with anxiety symptoms, chronic pain symptoms.

ST: Studies have shown the things you dream about can change when you're dealing with depression or anxiety. People with schizophrenia can even experience more hostility in their dreams than others.

AH: One of the first places I would go would be to take all those correlations and see if you can use tools to make those correlations causal and say, hey, I'd like to purposefully make people learn a foreign language faster by having them dream in Spanish. I'd like to purposefully guide the trajectory of a depression or an anxiety or a chronic pain by shifting these internal landscapes.

ST: We have not proven these things are possible yet. And when it comes to meddling with people's minds, there are many ethical questions that need to be answered.

AH: Because dreams are, to many people, such a sacred, spiritual, personal space. And I think that I'm more careful now, perhaps, than I was, but I try to be very careful in thinking I know too much about what other people should do with my dreams. Those internal kind of landscapes.

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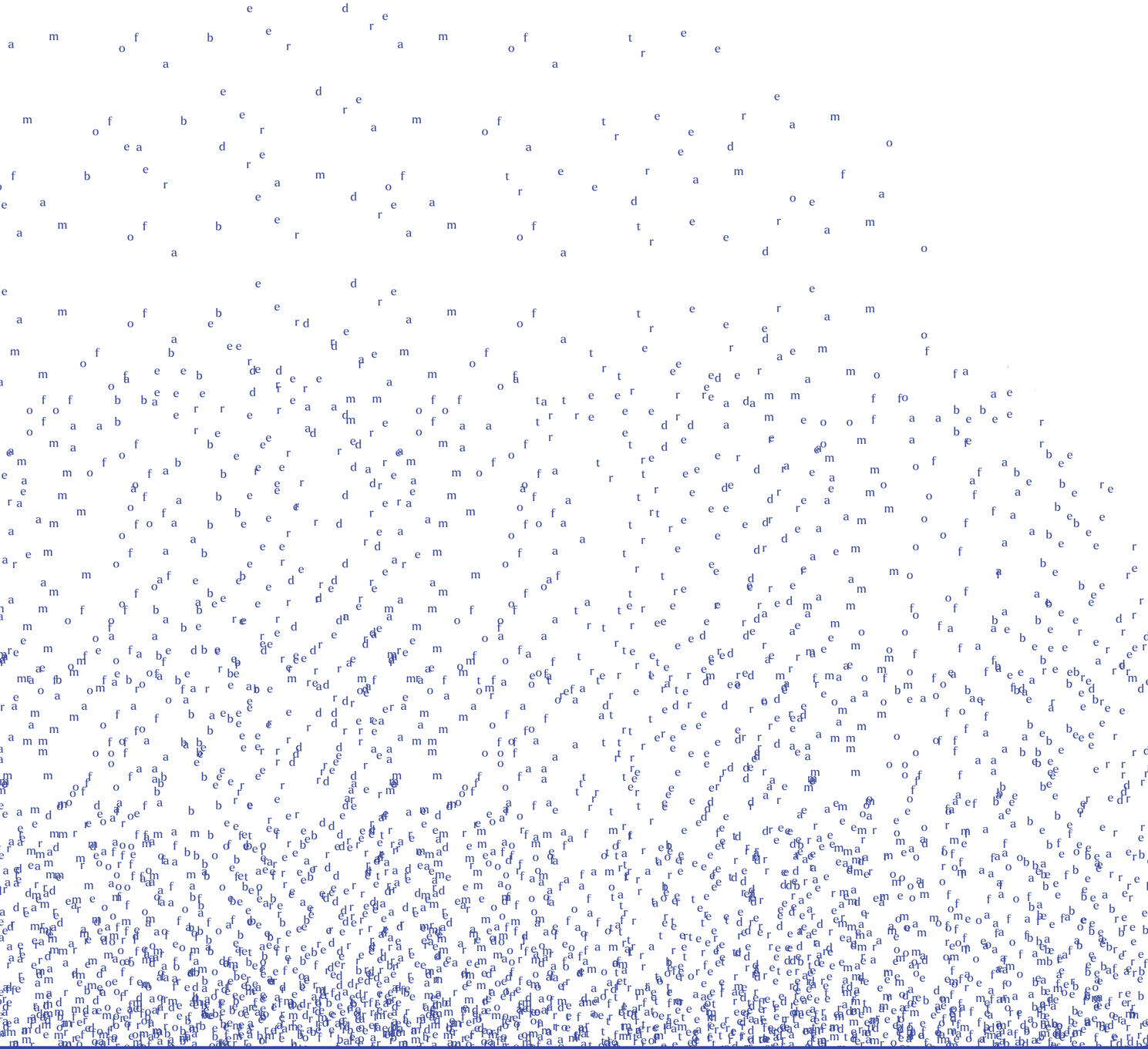


SQ: Shelby, this is an ethical conundrum.

ST: Yeah, and you can tell listening to Adam that he's at least thought about this, but not everybody has given it as much thought as Adam has.

SQ: There are people I can think about who I definitely wouldn't want manipulating my dreams.

ST: Mm-hmm, exactly. It's a long list once you actually get into it, which we will. And it's not theoretical either. This has actually started to happen. Dr. Haar Horowitz found out quickly the more sinister impact dream incubation could have.

AH: After I had published my master's thesis showing that this was possible and listing all the ways we were very excited about it being used, there was a big American beer brand called up and said that they wanted to use targeted dream incubation to make people dream of beer at the Super Bowl.

SQ: That is really messed up.

ST: You don't want to be dreaming about beer?

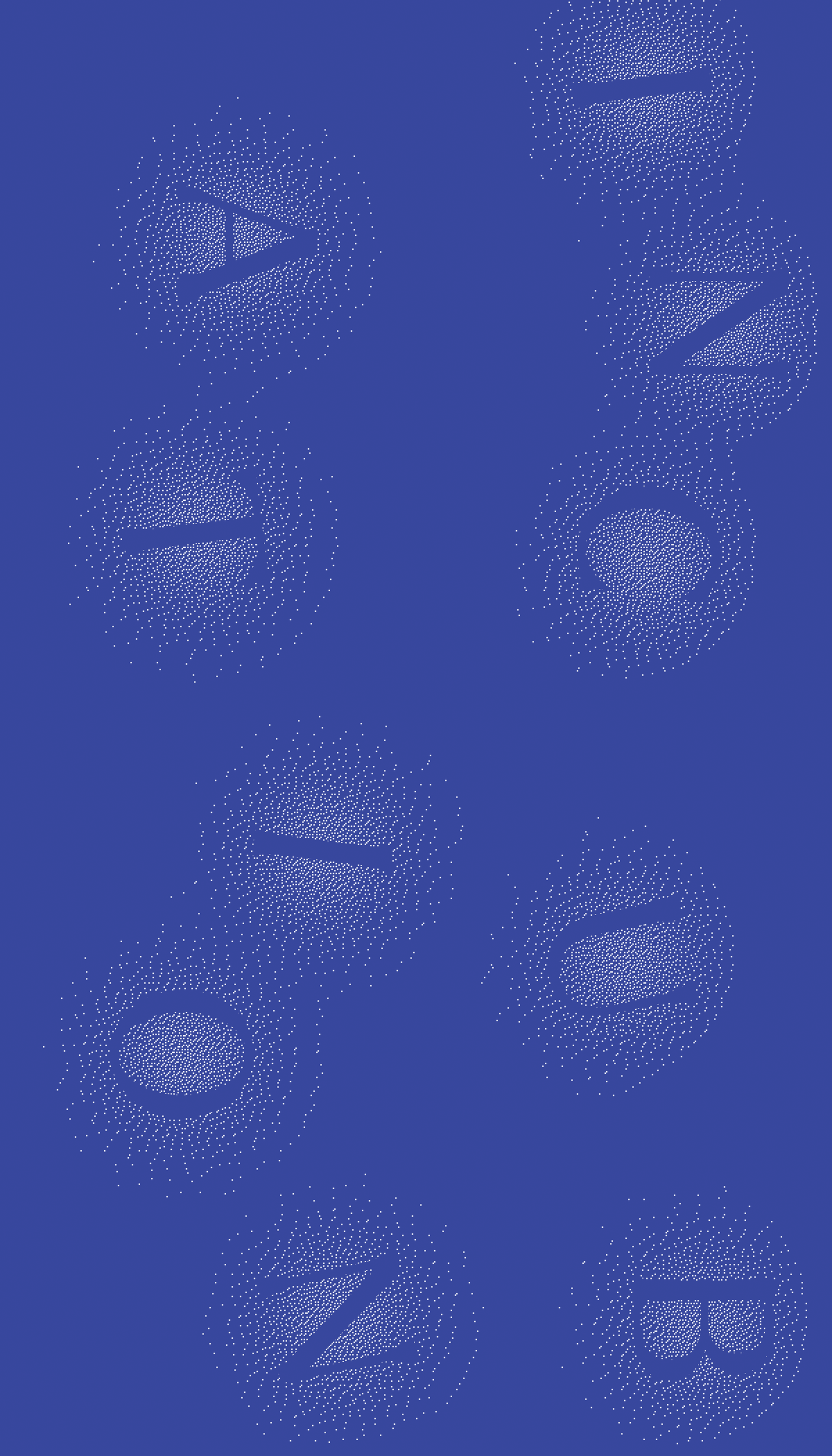
SQ: Well, I don't want my dreams incubated by a company in order to make me want to potentially buy more of something.

ST: Can you imagine waking up and craving beer and having no idea why? Well, that's what this company wanted.

AH: So they wanted to use a commercial time to tell people that if they scanned a code, listened to a soundtrack as they fell asleep, then let them play sounds to them over eight hours, that they would give them a free 12-pack of drinks. And they did it, despite my objections and the objections of my colleagues.

ST: Using dream incubation to sell beer might not be the most outwardly evil use of this technique, but it is eerie to imagine a world where advertisers are vying not only for our attention while we're awake, but also while we're asleep.

AH: There's another set of studies which shows that if you don't just leave it up to people's waking behaviour, but you actually play sounds related to certain products like Skittles or M&Ms while people are asleep, you're able to shift their preferences towards, for instance, one snack or the other. You're able to increase the amount they're willing to pay for one food or the other.



ST: Advertising doesn't just extend to products. We're not just consumers, we're also voters. If we're not careful, could we be asked to dream of electoral candidates and legislation rather than trees and rabbits? This is a future Dr. Haar Horowitz can see all too clearly.

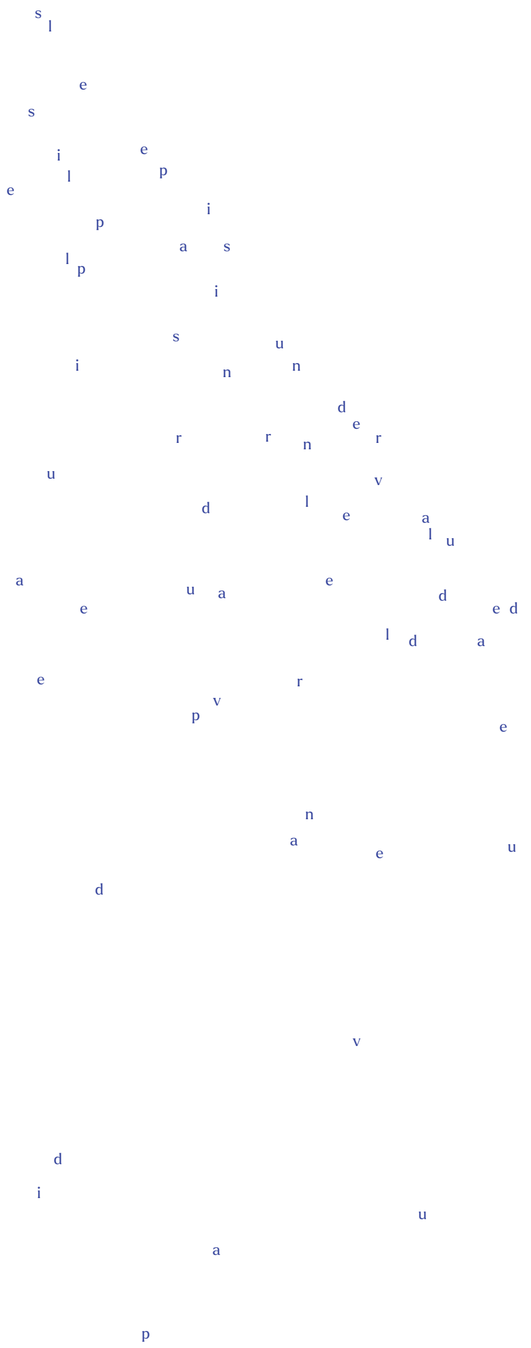
AH: There's quite a different set of implications when advertising really steps into sleep as opposed to tries to grab as much of the waking space as it can in hopes that something sinks in later.

ST: It's worth pointing out that some researchers are sceptical of how effective dream manipulation can possibly be and therefore how concerned we should be. But having seen dream incubation up close, Dr. Haar Horowitz believes these ethical discussions are important.

AH: People are particularly vulnerable, and particularly associative, their defenses are particularly low when they're asleep. And the same kind of interventions that could shift your behavior in really significant ways when they're introduced in unconsciousness or in dreaming consciousness will have no effect when your defenses are up while you're awake. And you can imagine that there's a lot of sinister uses for that. But all those sinister uses are coupled with all the potential for clinical, positive, revolutionary outcomes.

ST: We're not just vulnerable when we sleep. We're also malleable. We're processing information, making associations, storing memories. It's a mind state that's very different from when we're awake and just getting through the day. So can we use that mind state for positive change?

AH: And if you think about the difficulty with addiction or the difficulty with trauma, you would come against this idea of a rigid kind of cognition. It can be a rigid association between something banal and a deep fear. It can also be a rigid association between something harmful and some positive physical feeling. And if you were able to find a state where people are more malleable, then you can shift those.



ST: An example of this is helping people break habits including smoking. A study in 2014 showed associations made during sleep could impact people's behaviour when they woke up for several days.

AH: They were able to shift smoking behaviour by putting the smell of cigarettes along with the smell of rotten eggs into people's nostrils while they slept. And those smells were then associated so that people were disgusted by cigarettes and smoked less. But the interesting thing was, if you introduce the same two smells in people's nostrils while they're awake, it has no effect on their smoking behaviour.

ST: It insinuates that we're more open to suggestion when we're unconscious. Whether or not dream incubation goes on to have the clinical benefits that Dr Haar Horowitz hopes it will, he wants people to gain a better understanding of how important sleep is in all our lives. It's not a wasted eight hours, if you're lucky enough to get that. It's an essential time for making sense of ourselves and the world.

AH: Sleep is not just a time where, oh, during the day I interact with the world and become who I am and then in sleep it's kind of calcified or kept in stone. No, sleep is the time when all these experiences from your day are combed through, associated and selected so that they can become the kind of person you are from 10,000 days. We're never going to remember everything that happens to us and we have to do a kind of meaning-making, evolution, gist extraction, cooking down of all that experience and that happens during sleep.

ST: And because all of that is happening during sleep, what can we do with it? Do we let it be or do we try to shift the outcome, break a habit faster, learn something quicker, or get over something sooner? Can you really do all that during just eight hours of shut-eye? Dr. Haar Horowitz thinks you can.

AH: If you understand the ways in which the things you're thinking about as you fall asleep become your hypnagogic dreams, become your N2, N3 REM dreams, then you can, instead of just having that happen in ways you don't want, you could take a degree of control and make it happen in the ways you do. It's just that sleep is undervalued and underappreciated and so we haven't taken seriously the kind of toolkit it can be for shifting our waking life. And because it's a powerful tool, there's potential for powerful misuse.