

Daydreaming, Night-dreaming, and Stimulus-Independent Thought

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The Philoctetes Center

Oppenheim: Lois Oppenheim
Antrobus: John Antrobus
Klinger: Eric Klinger
Mason: Malia Mason
Person: Ethel Person
Singer: Jerome Singer (moderator)
Audience: Speaker from the audience

Oppenheim: I'm Lois Oppenheim and I'd like to welcome you all to this event of the Philoctetes Center, which is co-directed by Francis Levy and Edward Nersessian. The title of this afternoon's roundtable is "Daydreaming, Night-Dreaming, and Stimulus-Independent Thought." It is with great pleasure that I introduce to you the moderator of this event, Jerome Singer. Dr. Singer holds a doctorate in Clinical Psychology from the University of Pennsylvania and is a graduate of the William Alanson White Institute of Psychiatry, Psychology and Psychoanalysis. In addition to clinical practice, he served as Director of the Graduate Program in Clinical Psychology, first at the City University of New York and subsequently at Yale University. His research areas have included laboratory, psychometric, and developmental studies of daydreaming, consciousness and cognition, as well as personality. His books include *Daydreaming*, *The Power of Human Imagination*, and *Imagery in Psychotherapy*.

Singer: It's really a pleasure to be here and also an honor to be invited to what I think is a really imaginative, great society that has developed in the last few years in New York City. Let me just quickly point out the origins of the whole study of daydreaming, night dreaming, and the stream of consciousness. A lot of this can be traced back to William James and his book in 1890 on the principles of psychology, which not only over these many years has influenced psychology research and other behavioral research, but also had a considerable influence on literature, particularly works by Virginia Woolf, Dorothy Richardson, James Joyce, and especially, more recently, Saul Bellow and others. In a way we're on a fringe on the one hand, of a very systematic, scientific research, and on the other, of approaches to the beginnings of a lot of important modern literature.

I just want to quickly mention that subsequent to the work of William James, there then was Sigmund Freud, who himself developed the method of free association in psychoanalysis. Although I'm willing to bet that he was influenced to some degree by William James' work, as well as others many years before, in Germany.

In the 1950s and '60s we began to see a shift in psychology from a primarily narrow stimulus response approach to what I would call cognitive affective research on consciousness. One of the leaders in developing this was Silvan Tompkins, but then there was just a tremendous burst of

energy in the area of cognitive psychology. At the same period as this was happening, you began to have laboratory studies of night-dream research, and I would mention especially William Dement, who focused on the dream side of the sleep cycle, which was extremely important. One of our first presenters today is John Antrobus, who, believe it or not, worked closely with Dement and literally took over his apartment and laboratory.

Antrobus: You have to mention Charlie Fisher, too, who is the first psychoanalyst to really get involved in all of that.

Singer: Right. Yes. I would say I was involved, as was John, in the emergence of research methods for studying daydreams and ongoing stimulus-independent thought, or what we call SITs, or task-unrelated intrusive thought, TUIT—sort of to hint at intuition, you might say. But there has been a real burst of research in that area that has continued, and you'll hear more about that as we go along.

Let me first introduce our panel. I should mention that we hope to bring out some of the clinical aspects of this work as well as the more pure research side of it. I myself have done work on the uses of imagery in psychotherapy, or the uses of daydreaming processes. Also representing psychoanalysis, we have Dr. Ethel Person, who has been an expert on the whole area of fantasy for many years and will represent her position. John Antrobus is currently retired officially from City University, but still runs a neuro-cognitive laboratory there and continues with some of the night-dream research laboratory work, as well. Eric Klinger here is one of the earliest systematic investigators in the field of the stream of thought and the structure and function of fantasy. He's published important books in this area; one of them, *The Structure and Function of Fantasy*, a book on daydreaming, and another book that I happen to think is a very, very important called, *Meaning and Void*, which I don't know if we'll get into, but it's a very powerful book. He is a professor at the University of Minnesota, both the Morris campus and the Minneapolis campus. Malia Mason is perhaps more junior in terms of years—that should be apparent—but she has done what I think is very important work and had a very significant article published in *Science* quite recently, in which she has shown relationships between behavioral research on ongoing consciousness and what might be called stimulus-independent thought, as well as the ways these are reflected in the brain function. Dr. Person, who I've already mentioned, has had a long career. She's a professor at Columbia University School of Medicine and also closely tied in with the Psychoanalytic Institute at Columbia and has carried on studies, one of which is represented in the book *By Force of Fantasy*. She's also done work on love and romantic fantasies. She'll speak for herself about this some more.

So let me first turn your attention to John Antrobus to describe some of his work and some of his theories. These will be kept short because what we are looking for here is an interaction amongst the five of us, leading into opportunities for group discussion from all of you.

Antrobus: Okay. Jerry and I, by the way, have been working together for almost 50 years. That's a long time. I've never had a better colleague to work with, I must say. I'm interested in how the brain-mind actually creates thought, how it creates perception. What you're doing now: you're listening to what I say; the noise that's coming out of my mouth. You're interpreting it into words and into meaning in sentences. It's a very, very complicated process. That same brain-

mind also switches offline from time to time—you've been thinking about some other things other than what I'm saying. What is the economics of the decision to go online versus offline, and what parts of the brain actually create those offline thoughts and images in waking, or in sleep, in dreaming? So that's all there is to know about life, as far as I'm concerned. Nothing else really matters.

The brain's a very complicated place. There are ten to the eleventh-power neurons, ten to the fourteenth-power synapses—it's beyond possibility that you and I can ever comprehend it in more than a fragmentary kind of way. One of the things that make it difficult for us to actually engage in this enterprise is that we use symbols and words to try to understand it, and the words and symbols and categories—every last one of them—are massively gross, full of air, and therefore lead to all kinds of problems in understanding. Our brain, one of its problems, is that it has to stick on a small little neck like this. It's not like the whales; you can't float it in the ocean. To make it small, it's got to be very efficient. Therefore, it has to summarize massive amounts of data in order for us to carry it around. So it's simplifying, simplifying, simplifying, all the time, at every level, it's simplifying. That's the only way it can really handle the amount of data that it gets. How it does that has implications for how we have our thoughts, our perceptions, and how we have dreams and daydreams.

The brain is a vast interpretative organ. It's made up of not only neurons, but each neuron has on the average, say, a thousand connections to it. That neuron is interpreting all those connections to decide whether it's going to fire or change its state. Those neurons are in networks of neurons and those networks resolve into some solution. That's an interpretation of a large set of neurons and then those neurons are embedded in regions of the brain. Different regions of the brain then have to decide what's going on in terms of that set of neurons, and then different regions talk to each other. One of the things that happens at nighttime is that they don't talk to each other the same way as they talk to each other in the waking state. So in the nighttime you can have a dream and one part of the region—the visual part of the region, say, V1 or V2, moving up to the visual part of the cortex—might identify a face or something like that, and it's a girl. But another part of the brain over there, maybe further down in the interior region, may be saying, "Oh, that's my brother." And they don't speak to each other in the same way that they do in a waking state. You never get someone saying, "It's my brother but he's a girl." But at nighttime, in REM sleep, you can. You don't make mistakes like seeing somebody's nose upside-down within the visual part of the cortex. You don't get those kinds of errors. You're more likely to get errors between the meaning of something and what you see. Things like that. That's one of the things that's sort of interesting to me. So it's the lack of proper connectivity in REM sleep. Because if it was fully connected then you'd be awake, so you wouldn't be in REM sleep.

Ultimately, I wanted to get to talk about attractors. Attractors are new mathematical models to think about how regions of the brain, neural networks, talk to each other. We tend to think that because of our language, and all kinds of theories, we tend to think in feed-forward, one-direction kinds of modes. "This is the input to that and this is the input to that. Things move in one direction." In fact nothing moves in one direction in the brain. Not even anything. Everything is a back and forth, back and forth. All connections are both ways. Parts of the visual cortex have 10 times, 11 times as many neurons going down as they have going up, and yet the

theories are all going up—unbelievable that that should happen. We've known that for 20 years, but the theories are one way, nearly always.

So what happens is that each region actually acts as a context for its neighbors, constraining what its neighbors can do. No region talks on its own. And this, again, is our limitation as theorists. We tend to think of parts of the brain as little neat packages that have high walls around them. This one does this and when it's finished, it passes it on to that one, which does this. That's just not the way the brain goes. Thinking doesn't go that way, either. Each region massively constrains what the other ones do. That's why our thoughts are as coherent as they are. These are called attractors. It's a mathematical kind of concept that not many people know about that much in psychology and in neuroscience. The best place to find out, if you want to read anything about it, is probably O'Reilly's book on neural networks. If you'll look up Randall O'Reilly, that work in neural computational models is the best. Computational models, by the way, are something we can now understand in the brain because of the high-speed computer, we can actually start to simulate things that happen because in our minds we can only work with a few variables at a time. Remember back in the old days, when they gave psychologists variables in diagnosis? By the time you've got three variables, the clinician cannot do better than a good mathematical model. He's always doing worse. You used to think, 'Well, we'll get your math balls and then we'll modify them,' and they always did worse. Imagine working with ten to eleventh-power neurons? It's not possible for us to begin to understand how those work. You have to have computational models. There's no way to understand it without them.

Anyway, I didn't mean to talk about that too much, but that's what's interesting for me. It's how these networks go and how they are then related to the values of the organism, and that's where it has its tie into psychoanalysis to some extent. But these values are distributed over large regions of the brain. So we can talk about the amygdala and sort of the more primitive emotions, like we used to think of the limbic system. Not everything is going to be tied directly down into the amygdala. So we learn the values of all kinds of things—behaviorists used to call them 'secondary reinforcers.' We use all kinds of symbolic stuff in clinical psychology, but how do you get these learned values and how are these learned values are distributed? They're micro-values; they're not values the way we use them in our ordinary language. It's all the way down to small sets of neurons that are below your ability to sort of penetrate with your consciousness. How those values are created is interesting. That determines really what you think about and what you don't think about.

Anyway, back 50 years ago, we had behaviorists telling us that we couldn't even ask anybody what was going through your mind. When Jerry and I first got together—you can't have a science of mind wandering and daydreaming unless you can measure what you're talking about. You have to measure. Without measuring you haven't got anything. So we had people telling us that we should use the Rorschach, but we shouldn't have asked anybody. Then, oddly enough, a few years later, here's a physiologist who wakes somebody up in the middle of the night, looking at the brain, and Clayton is alive in Chicago and he sees the eyes moving and so he wakes him and says, "That guy must be watching his dreams." He wakes him up and sure enough, he's reporting vivid imagery. It took a physiologist to ask somebody what was going through their mind. It was not possible to do that in psychology in the '50s. So we jumped in, didn't we? One of the first things we did is we started getting ways for people to report what was actually going

through their minds. So we did questionnaires, we did interviews, we did all of those kinds of things. But ultimately, we developed a technique. We didn't even want to have them rate their dreams from 1 to 10—we didn't trust that. So we interrupted them automatically with a machine every 15 seconds and said, "Throw the switch right or left. If anything went through your mind that was not a perception, that was not actually directly related to something in this room"—that had all the lights on, by the way—"except the task they had to do, which was a simple visual task." So we actually found a way then to actually measure the yes or no, every 15 seconds, whether something went through your mind that was created. That's where we began, and that led us to big surprises. Actually, people were producing something practically every few seconds. You didn't have to wait for 15 seconds. We then move the intervals down from 15 seconds to about 5, and people were still producing thought that was not a perception. Then we realized this whole thing—we used to think something would happen every 15 minutes, your mind would wander and so on. But every fraction of a second you're off. That changed the whole way we looked at it.

All this, by the way, was in the background—I should stop talking pretty soon—where the psychoanalysts all thought that mind wandering was a protection against sex. Then there were the socialists, who felt it was all a waste of time—you're working and therefore it was a bad thing to do from that point of view. There were all these background ideas that we had and Jerry came in and he felt this was positive and healthy. It was part of how you planned your way through life. It was a way to explore what things you might do in your world. And it was sort of playful, but then eventually we moved into sort of problem generating—the things that might be of personal concern, which was Eric Klinger's idea. Things that mattered to you that maybe you needed to do. And then we got together on the same contract. Anyway, that's where we all started.

Singer: Thank you. I should mention that Eric is in an interesting way a tie to the more clinical side of dreams and daydreams. He literally overlapped. He was born in Vienna; Freud was thriving in Vienna at the time. But I don't think they ever got to meet.

Klinger: Well, first of all, let me state that you've just heard the two pioneers that originated the post-Freudian era in daydreaming thought and research. So certainly everybody owes them a great deal. What I'd like to do now is just make a few short points. I'd like to talk a little bit about what exactly we mean when we talk about daydreaming. There's a definitional problem that we need to address. Then I want to just very briefly introduce the daydreaming area from an evolutionary standpoint, an evolutionary perspective. Then talk extremely briefly about the evidence underlying this and also some things about the extent to which we're talking about a perfectly natural and normal phenomenon.

Okay, let's start with what exactly we mean by daydreaming? Now, there are probably three kinds of definitions of daydreaming that have been used—this is oversimplifying. But one, which you've already heard mentioned, is task unrelated thought. That is, thought that isn't related to what you're doing at the moment. A second is fanciful thought. That is, thought that departs from reality in some significant way. A third is undirected thought. That is, thought that's spontaneous, that you didn't mean to have, that flits through your head, and you don't use it. It goes out the other end. So, what you might call undirected thought or spontaneous thought.

We tried to measure these kinds of things separately—thought-sampling people and getting them to report at a beeper what was going through their heads and to rate that. We tried to assess all three of these dimensions, figuring, “Well, people are really talking about the same thing; we should get a good deal of convergence here.” But what actually happened was that we found, using factor analysis, that we had three virtually independent dimensions of thought flow. Something could be task-related and either directed or not directed, and either fanciful or not fanciful, and so forth. All possible combinations. So these dimensions are really quite unrelated to each other. What it would really make sense to do from a technical standpoint is to think in terms of those and other dimensions of thought flow and where a person’s thought at that moment falls in this hyperspace of many dimensions. That would be the thing that would make the most sense, but it’s cumbersome and it’s hard to talk about. And people insist on talking about daydreaming, so let me define what I will mean by it. I’ll mean two kinds of things: either spontaneous thought or thought that is fanciful. So when I say daydreaming, that’s shorthand for one or the other or both of those. I’ll try to indicate which one I’m talking about.

Now, from the standpoint of evolution, let me just back up to the beginning of life, in a sense, if I’m not pushing the envelope too far here. What differentiates animals and, of course, humans among those, from plants and other things—one is chlorophyll, but the other is goal-directedness. That is, the extent to which the organism strives for goals. Plants don’t. People do. In that sense, then, human life really is a series of goal pursuits. That’s very important because it means that successful goal pursuit is the pre-condition for the survival of individuals and also for species. What that means is that everything else in evolution must have evolved in the service of successful goal striving.

Now, in order to have a goal pursuit, in order to pursue a goal, there has to be some kind of internal representation of the goal while you’re pursuing it. There has to be a prospective memory that you are pursuing the goal. There has to be something that orients the person toward the things that are related to that goal, in order to make an efficient pursuit of the goal possible. So we have to posit that there is an internal process that begins when you commit yourself to a goal and ends when you’ve attained the goal or given up on it—that’s a complicated process, the giving up. I’m not going to talk about that, here. In the meantime, there is this latent brain process. I say ‘latent’ in the sense that it’s not something that’s constantly consciously on your mind, but it continues to influence you, even when you’re not thinking about that goal. Long ago, at the very beginning of thinking about this, I called this ‘a current concern.’ I’m not sure I should have called it that, but that’s what I’ve called it. It’s in print amply and so I’m going to stay with the concept. So, current concern refers to this latent state in the brain and what does it do? Well, it sensitizes the individual to respond to cues that are related to that goal pursuit. In other words, when encountering a cue of that kind—for example, you’ve got a plugged-up sink and you’re away from home, but you happen to see a sink somewhere and it immediately reminds you that you’ve got to get that sink unplugged. It reminds you of that at varying levels. It’s an emotional reaction: “Oh God, I’ve got to go unplug the sink.” It’s a cognitive reaction. It may or may not be conscious, but, when conscious, you are mobilizing your thoughts about, “Jeez, what’s the number of that plumber again?” and so forth. It’s an action response if the circumstances are opportune for acting on that goal pursuit. So if you’re at a phone and you remember the plumber’s number, you’re likely to call the plumber.

What happens if you have the cue and you're starting to respond to it, but it's not an opportune time to do anything about it? What I'm positing here is that what happens then is that the process unfolds, but you inhibit the action. But what you are left with is the emotional and the mental parts—the cognitive parts of it. Those are the germs of daydreams. They're the germs of other thoughts, too. But if this is a spontaneous kind of thing—you're not meaning to have it, it just pops into your head—it qualifies as a daydream by my definition. So I'm arguing that at least the mind-wandering part of daydreaming is just that. It is responses to cues that remind you of your goals and you are responding as far as you can, given the circumstances, given the advisability of acting or not acting.

Now, that's the nub of the idea. How do we know this works? Well, we know it works from quite a lot of evidence that has accumulated. I did some dichotic work back in the '70s with a lot of other people involved—there are a lot of controls, but I don't want to get into the details of this here—in which we had people listen to tapes that were, as far as they know, unrelated to anything important in their lives. These were usually students brought in and in this case paid to sit and listen to two narratives at the same time, one in each ear. We salted these narratives very unobtrusively with cues that were related to the individual's goal pursuits, which we had assessed at an earlier time. And what we found was that what people were paying more attention to—because we also had a measure of what track they were paying attention to—was disproportionately those passages that were related to their goals, even maybe indirectly. They recall those passages about twice as often and when we stopped shortly after one of these cue passages and asked them what they were thinking about, their thoughts were related to one of those cues about twice as often as they were to other cues. So very clearly, we got a lot of control of the flow of consciousness at several different levels, simply by cueing what we knew were their goals.

That's one kind of evidence, and there are a couple of other kinds of evidence. How automatic is this? Well, we did the same thing with dreams. That is, we didn't play tapes continuously, but intermittently during the night we cued goals by playing tapes that gave them a word or a short phrase related to one of their goals or to something we thought was one of their goals. Then we woke them shortly thereafter and asked what they were dreaming about, and the goal-related cues produced about three times as much content related to the cue as was true of the non-goal-related cues. So again, clearly the brain even while in sleep—and that's presumably pretty automatic then—responds to a cue related to one of the person's individual goals.

There are a lot of other studies that have been done with distracter stimuli and the Stroop color-naming measure and so forth. I can talk about this later if anyone wants to know more details on this, but the point here is that what we discovered from those studies was that not only do people respond to goal-related cues in this way, and not only does this happen automatically and not consciously in some cases, but it's also kind of inescapable in that if you have a cue out there that's related to one of their goals but they're not supposed to pay any attention to it—and as far they know consciously, they don't—nonetheless, it slows down their processing of the things they're supposed to be working on, because the brain presumably has given processing priority to this goal-related cue, even though it's irrelevant to what they're trying to do at the moment. So this process, this current concern-based process of sensitization to cues, is a very powerful one.

Let me just make one more point, which is what good is it and how natural and normal is daydreaming, including the fanciful parts of it? Well, first of all, I think everybody with an intact brain daydreams. Anna Freud herself went back into analysis two or three times in order to rid herself of her daydreams, because of her conviction, thanks to her father, that this was an infantile kind of thing, a neurotic process that she wanted to rid herself of. She never succeeded, as far as we know. We hope she didn't because it made her more creative, I'm sure, as a psychoanalyst. These daydreams have tremendously important functions: they help keep us organized, because when you're doing one thing and your mind isn't 100% engaged with it, what your mind is doing is working over cues related to other goals. And so you keep the whole personal agenda of goals before you and fresh, even while you're focusing on one thing. It's a reminder mechanism: "Oh yeah, in another hour I have to be there because of this other thing." It's a way of keeping yourself organized. It's a rehearsal mechanism; it's a review of the past mechanism—you learn from the past through it and so forth.

I'm going to stop here by just pointing out that there have been some investigators who recently have suggested that there's a relationship between daydreaming that is "fantasy-prone" and psychopathology. I've looked into this a little bit and I think it's because of the confounded way of assessing daydreaming. I'll stop there.

Singer: Dr. Malia Mason is on the faculty of Columbia University. She gives us a chance to hear something about some of the newer research that follows on what we've just been hearing. But also that begins to get literally inside the brain. So her studies have been both behavioral psychology studies and then studies using brain imagery like fMRI to test some of the hypotheses growing out of the kinds of things that you've just been hearing about.

Mason: Thank you. First I just wanted to acknowledge that it's somewhat surreal to be having a conversation with my intellectual heroes. I almost feel like I'm daydreaming right now. But I actually think that the most useful thing would be to explain why I took this topic on as a research endeavor because I think it highlights why I think it's important. I think of myself as a psychologist, so I do brain imaging research and I do behavioral work, but I'm actually really interested in thinking behavior and how this happens. At some point I looked around me and said, Okay, well, I'm surrounded by all these other psychologists who say they study thinking behavior, but for the most part, what they study is problem solving and goal-directed thoughts. So they'll bring someone into the lab, they give them a chess game, and they'll say, 'Okay, play this chess game.' Then psychologists measure how thought unfolds in relation to that task. I guess I thought to myself, how much does that really capture what it is that humans do on a moment-to-moment basis? My intuitive thought was that, really, not very much. So that was one motivation for going into this.

I have a background in cognitive neuroscience and there's a methodological problem in brain imaging studies. It's that in all of these studies you acquire images of the brain during a baseline period when people aren't doing anything except for lying in the scanner and looking at a fixation cross. What people were finding is that there was a consistent network of brain regions that were active during those time periods. So across everybody, the brain's recruiting these regions. And everyone's like, why is it? What are these regions doing? I felt like the obvious answer was that the brain was thinking about things that were not related to the sensory

environment. So at that point I think I came across your book on daydreaming and it was extremely inspirational and then I came across everyone else's work.

I just wanted to say one thing—well, maybe I'm going to say more than one thing. This network of regions that's active across people—basically what people find is that this network is active unless you give people something difficult to do. So everybody shows recruitment of these regions and then if they have to engage in something difficult, activity in these regions is attenuated. So yes, the network is referred to as the “default network.” It's thought to be associated with some default state of the brain. One of the positions I've taken is that this type of thought is some sort of default mental state, that daydreaming or mind wandering or thinking about things that are unrelated to the external environment is the default state of the brain. That for the most part we walk around in this state and then when we're confronted by something that requires our attention, we have to suspend that mode of thought and then engage.

I wrote down a list of things that I thought would be interesting to talk about, not because I necessarily have the expertise, but because I wanted to hear what everyone else had to say about this. One of them was daydreaming content, but I feel like you've addressed this somewhat. But maybe we could talk about it more because in my own work, all I've basically shown is that this network that is extremely active when you don't give somebody something to do is associated with daydreaming. But that's not necessarily very helpful; it's very vague. I think ideally what I would like to be able to do is talk about what in particular people are thinking about when you don't give them something to do. Are there daydreaming styles? Do people have a style of daydreaming that they kind of default to whenever they're in an environment that doesn't engage them.

I also wrote down adaptive function. I have argued that we have this default psychological state that consists of daydreaming. If that's the case, you know, people always want to know what's adaptive about that. I think you've said a lot about what might be adaptive about it. One thing I wrote down here is, “Working on problems across an extended period of time.” And the other thing is that I'm not sure we necessarily evolved daydreaming as a default mental state because of this reason, but I do think that people tend to use it in sort of a coping manner. One way I like to think about this is to say, “Okay. Imagine if I couldn't daydream. Imagine if I was stuck on the subway and I was bound to the external environment. I think I would kill myself.”

I wrote down perspective memory, but I feel like you've talked about that. I have a background in social psychology, as well. One of the things that I think it would be interesting to think about is the extent to which our daydreams involve other people. My impression, based on the limited research I've done on this topic, is that we spend a huge amount of time while we're daydreaming thinking about our interactions with other people. I think there might be a specific adaptive problem that's social in nature.

I think thought suppression and daydreaming is really an interesting thing to think about. When we have daydreams that are about something maybe we shouldn't—I just feel like at some point thought suppression becomes a goal, and then that is something that keeps reoccurring in your daydreams. I think that's something interesting that maybe the group can talk about at some point.

The last thing I wanted to say is that it's really interesting to think about the relationship between attention and awareness in this type of thinking. So one could argue that what fluctuates is not the production of these thoughts, but our ability to attend to these thoughts. They're sort of always going on in the background, and what fluctuates is just my ability to kind of tap into those thoughts. I actually think that by looking at daydreaming and dreaming together, one might be able to address that question in a better way.

Singer: Thank you. Now, I think where you're sort of pointing to is some of the actual practical or clinical uses of daydreaming, as well, and that brings us to Dr. Ethel Person. I've mentioned some of her book already and her work on fantasy. I have to say one of the things that's especially intriguing that I think ties you both together is the extent to which Dr. Person has called attention to the way daydreams are sometimes shared, sometimes by just a couple, and it forms a pattern of a relationship. But often it gets to be shared by large groups of people. The pattern of the fantasy content gets shared and can have some significant implications as well

Person: I have a different take on fantasy. Not a scientific approach, but really one from psychoanalysis and psychotherapy. I'm going to actually use one of your daydreams and one of my daydreams. I'm going to start with one of his Dr. Singer's fantasies, which I adore. "Within the format of my fantasized football games, Poppy Ott emerged as the superstar, the shifty-hipped, clearly clever, broken field runner and accurate passer. As time passed, the overt motor representation of an imagined game was no longer socially feasible." He says, "I began to draw the game on paper in cartoon form." I'm hoarse. Can you hear me or should I have somebody else read this?

Antrobus: Did you drink some water?

Person: It's not going to work.

Audience: Bravo for effort.

Person: Can you hear what I'm saying? Would you like to read this?

Singer: Oh, all right.

Person: Begin with you, and then I have a fantasy about me in here, so just keep going.

Singer: Okay.

Person: And I apologize. I've tried hard to get rid of it.

Singer: Okay. This is a fantasy of mine. I was not in therapy with Dr. Person. It actually was published in an early book that I wrote on daydreaming. "Within the format of my fantasized football game, Poppy Ott—who was a character in a children's novel that I used to read—emerged as the superstar, the shifty-hipped, clever broken field runner and accurate passer. As time passed, the overt motor representation of an imagined game was no longer socially feasible

and I began to draw the game on paper in a cartoon form. I would visualize an entire league series, drawing significant highlights from each game, occasionally writing out play-by-play accounts of the games. I would keep statistics on the various achievements of my fantasy players of the games, in the same way that the newspapers do for running or passing averages. As I grew into adolescence, Poppy Ott, who was supposedly a few years older than I was, grew up, too. He left Tutter, Illinois, which was a town he lived in, supposedly, to play professional football. After some well-documented set-backs he emerged as the greatest football player of all time on a Boston professional team of my own creation.” There was no Boston professional team when I did this. Eventually they became the Boston Patriots, a pretty good team.

Person: They may have read your mind.

Singer: Okay. I’m just quoting now again. “Significant aspects of this Poppy Ott fantasy were initially inspired by my boyhood readings of children’s books which featured Poppy Ott. Then I borrowed the fictitious personage of Ott from these books and placed Ott into fantasies that continued the narrative mode of the original stories. The fantasies took over where the stories left off. In the original stages of his Ott fantasies, Singer depicted their content in dramatized actions, drawings, or in words. Later, he turned to visualizing as the predominant mode in which to realize these fantasies. The fantasies were not unrelated to actual events in Singer’s life. For example, they appeared especially frequently during the football season. In all of these ways, by dramatization, drawing, and writing, and by correlation with actual events, Singer drew on resources that reinforced the inner continuity, sequential character, and general credibility of his fantasy experiences. The result was that the entire fantasy sequence settled into a fairly circumscribe pattern. In high school and even into adult life, he would deal with situations that were monotonous or dull by resorting, through consciously playing out, a particular game in which Poppy Ott starred.”

Now this is Dr. Person’s talking for herself: “Strangely enough, football also entered into my early life preoccupations, though in a different form. I was born and raised in Louisville, Kentucky, where football games were a very big deal. Very early in life I started going to football games with my friends or with my parents. When I was around 12, I decided it was time for me to have a boyfriend, but I did not want to have one who was my age. I concocted a strange event, a kind of fantasy event. I always went to a high school football game and I knew that there was a perfectly gorgeous linebacker whom I wanted to have some kind of relationship with, though he was obviously some years older than I was. I thought I could correct the situation. What I did was to look him up in the phone book, place the telephone call, and tell him how much I admired his playing. How I picked him I’m not sure, but I was drawn to him. As it turned out, he was probably as shy as could be, because we began to engage in telephone calls back and forth, a couple of times every week. We came to know each other, or at least know each other over the phone. I was having a good time on the telephone and so was he and this worked so well, we never talked about meeting, only having these conversations. The next year I decided that since I was a year older, I could actually meet him. I was not really old enough, so that when I went up to him at the intermission to the football game and introduced myself, he was astonished. I think he was embarrassed to be seen with someone so young in comparison with the girlfriends of his teammates. We talked a few more times but the relationship waned. Nonetheless, it was one of the pivotal and interesting interactions of my early life. It was a safe

way to have an intense conversation with an almost grown man when I was too young to have one. I think it turned out to be a good thing for him, or so he told me, insofar as he said he had become much less shy. We parted as friends, spoke to each other several times after that, and all was well. I settled down to keeping my fantasies and not enacting them. Given our early life interests, it's not surprising that both Jerome Singer and I have been interested in writing about fantasy. Whether enacted or not, such fantasies are ubiquitous." Do you want me to go on?

Person: You don't have to go on.

Antrobus: This is before YouTube. Everyone's been talking about how that's killing the fantasy lives of adolescents.

Singer: Yes. My wife Dorothy and I have just published a book called *Imagination and Play in the Electronic Age* and it's mostly about children and about the fact that they have developed these avatars who are made up characters, alter egos for themselves, and they shoot them out into cyberspace and meet each other that way.

Person: I would like to say a little more about this because I think that it's an important personal topic for so many people. I think that some people don't talk about their fantasies, even when they're in therapy, because they're ashamed of their fantasies. I think that's a terrible mistake because I think that by drawing on people's fantasies, you really come to know more of their inner life in a way that they're not always willing to talk to you about. And it's the fear in exposing the fantasy that sometimes makes you feel foolish. Conscious fantasy is therefore must less dwelt on in everyday conversation than our dreams. I think we don't take full responsibility for our dreams and will tell people our dreams much more than we're going to talk about our fantasies. I think patients may fail to report fantasies, regarding them as too embarrassing, too revealing, or alternately as irrelevant, but they're eager to tell their dreams. I say this because I think it's very important—

Antrobus: You're quite right.

Person: —for therapists to really pull that out because that's really where the juice is. I guess I should say something about Freud. He was the one who really discovered the importance of fantasy in our lives. The way he came upon it led him to emphasize its role in psychopathology, rather than in health, which was a mistake. But that was because he really got his knowledge through patients who were suffering and had problems, so I think it took him a long time to get rid of just traumatic memories and get on to memories, as that which is so important in every practicing therapist's life when dealing with a patient. You really get the stuff out because you can interpret stuff that is not said in other formats. I guess that's all I really have to say, but I think that for all of us in this room that adaptive mode of fantasy, or the unadaptive mode, is very significant in how we understand our patients. I would say more but I can't.

Singer: Well, thank you for trying. I think we might want to now interchange some discussion. I think Dr. Mason has already given us some interesting questions. I have a question that I'd like just quickly for John to answer. One of the things that have been studied in the literature is the extent to which dreams and daydreams are opposites. Daydreams being conscious and night-

dreams coming at night, is there more unconsciousness in the reflection of unconscious motivations and problems in the night-dreams than in the daydreams? Are they on a different continuum, each of them? John has done some work looking at that process or at the nature of the actual content by waking people up during the night when they're in REM stages and has a good deal of information about that.

Antrobus: Well, I must say that words are the only ways that we really have to communicate to each other, but they are a can of worms. I don't feel the words 'conscious,' 'unconscious,' 'dreams,' or any of them, are more than very approximately helpful in any of this. Every single experience we have is in some sense unique. I've been in this field all these years and I don't know what it means to be conscious or unconscious. I really don't for a minute. I think nearly all of the things that we call conscious are produced by large regions of the brain working to produce the set-up to those experiences, of which the things we call 'conscious' are just one little fragment at the end.

So I go back—just to take off on the plants: the plants have goals and they engage in random activity. Their phototropism—they go towards light. Their roots go towards water. The tendrils of the vine reach out and play around to try to find something to hang onto. It has all the fundamental things that are related to adaptation in human beings. It's not conscious and it misses all that cognitive stuff, but it's—in terms of the adaptive aspects of it—the same thing as human beings. Without that they wouldn't exist.

Klinger: I would disagree with that, but go ahead.

Antrobus: What's different about all of this has to do with the fact that the human race has survived by working with other people. The thing that made us accomplish as much as we have is to communicate to other people. We make these noises back and forth and we have conversation and it's quite a while before we really know that we understand what somebody else says—like this particular conversation about consciousness. That's probably because we have this productive part of our nervous system, which is important for all social communication. That's the foundation of much of our fantasy and thought.

As a fundamental model, I would start like this: we have stimuli that we encounter in the real world. For any stimulus there are, say, five options that you could take and what you're going to do in response to them if they're important stimuli. That has to do with their relationship to the amygdala and some other parts of the brain. For each response, there are another five options of things that might happen if you do this one—it could be any of these things; some of them are good options, some of them are bad. For all five—that's already 25. Those are what I call your goal structures. You're tying these down to what's going to pay off and the brain, if it's working in an ideal way, is going to give the maximum utility for the decision. That's the foundation for all decision-making. We're not ideal choosers of the right thing to do because we usually engage in the short-term gains, like winning the next election instead of destroying the country's economy and so on. The short-term gains are very, very powerful because these tree structures don't survive so well. But that's true for daydreaming, which is your idea in some sense. It's planning—you imagine these things and you imagine the outcomes and each of these outcomes tails down to things that we've learned from the amygdala, which I see represented in the medial

prefrontal cortex. We've learned things that are good or bad. All these kinds of things that we've learned are nice and good to do and they all relate to our fundamental goals, but they are learned values. The things that activate the best of these learned values are the things that we might then, when we have a chance, actually act on. That's the daydreaming. At some point, if it looks like it's good, then you get in and you control the thought and you really follow it out and you explore it more fully.

In night-dreams, I don't think it's an awful lot different except in daydreams you may have different starting points. The regions in the brain in REM sleep may not connect to each other. If you put a pack of noise into a neural system, the system that creates faces is going to create faces; the system that creates names is going to create names. Normally they connect pretty well, but in REM sleep they may not.

But we now know that the diurnal rhythm at night reaches its lowest point two hours before you normally wake up. Then the brain starts to wake. Two hours after that point, if it keeps you in bed even longer, your REM sleep adds to that and that's the most active part of your brain you'll ever get. That's what I call the Super Dream, the Saturday morning dream, when you sleep late and you have REM sleep riding on top of the diurnal rhythm—those are the dreams you tend to remember. They're more vivid. And they're problem-related, too. You know, they get more related to the things you're going to have to do in the daytime.

You know when you wake somebody up, by the way, in the lab, those dreams are not so crazy. What we think is actually when you wake them up, they're continuing the dream process; the mind is still working with the stuff that was created in sleep and it starts to interpret. So there's this person in the dream while you were asleep and you didn't know who that was. You start to say, "Oh, it must have been my uncle because it was at the beach in the summer. That had to be who it was." You're actually still creating the mental process as you move into waking. And then these attractors that you've got have to go into this one or that one or that one. So it never stops. They're very closely related. We took people in the waking state and interrupted them—do you remember that study?—every six, nine, twelve minutes. We put them in a dark room, kept them fully awake, and their dreams—their thoughts, because they're fully awake, *fully* awake—are just as vivid. We measured with a very careful visual imagery scale. They're just as intense and they're just as bizarre as REM dreams. The only difference is that if you're awake, so you know it's imagery. If you're in REM, you think it's really happening. That's the only difference.

Singer: Does anybody else want to follow up?

Person: I think what you say is very important from a certain scientific point of view, but I think for a lot of practitioners—me and some of the people here—we use dreams really to discuss with the patients, to really find out what their meaning is, and why that dream is coming up then. I think it has many different values in very many different circumstances. I think some of the clinicians here will agree with that.

Antrobus: Well, you're more interested in trying to find out about what the person *is* and what their problems are. You're only interested in understanding the dream as a vehicle to understanding the person, aren't you?

Person: Yes, but that's huge.

Antrobus: Yes, I know. But it's a different goal altogether.

Person: Absolutely. That's why I'm making the point that there are two different meanings in terms of how people are interested in this.

Antrobus: Oh, yes.

Person: I think many people in this audience are very interested in the dreams of their patients. That's what I think a lot of people deal with and that's why I wanted to bring that up. I think you can read into that stuff that is buried and that helps you really figure out what your patients are struggling with, thinking about, that you would otherwise not know.

Antrobus: But you have to know both sides of that coin. I once was in a conference with a therapist who was interpreting the dreams of somebody that used to get into situations and then not be able to move. They interpreted that as a kind of resistance and passivity. They made a lot of personal interpretations about this. Now, if you look at REM sleep, what you do is, the brain stem activates the cortex, but it actually inhibits the motor—it inhibits the sensory input from your proprioceptive system, and it inhibits the motor action, so that your brain, your frontal cortex, doesn't move. You can't move. Some analysts have made the mistake of interpreting that psychoanalytically as some kind of blocking of their ability to deal with real problems, and really it has to do with just the part of the cortex that inhibits the motor.

Audience: So those illusions of hypnagogia.

Antrobus: Yes, exactly.

Singer: Did you want to add anything?

Klinger: Well, there are a lot of other ways in which night-dreams and daydreams are clearly different, but they also have a tremendous amount of continuity. One of the indications is that if you relate night-dreams to people's goals and daydreams to people's goals, you find that they're both about the same kinds of things. The same goals get reflected in daydreams as get reflected in night-dreams. Then there was a fellow whose name escapes me at the moment—he had a chapter in your 1978 book with Ken Pope and he's a Southern California psychiatrist. I wish I could remember his name. Anyway, he tracked daydreams across full days—individual people reporting through full days on their daydreams. Let me back up just a moment. As many of you probably know, at night there is an approximately 9,200-minute cycle and that cycle is one, among other things, of the vividness of the mental content of dreams. So REM sleep is one part of that cycle and it's when dreams seem most vivid. But this fellow, whose name escapes me and I apologize to him for that, found the same kind of a cycle during the day. That is, about every 100 minutes or so, you have a peak in vividness of the imagery in daydreaming, and then you have it subside and then come back another 100 minutes or so later. So that very same cycle seems to continue day and night.

Antrobus: It didn't replicate that much, though. There were a few studies of mine—

Singer: I can't go any further than what you just said. I don't know.

Antrobus: The rhythm—we've been looking at the rhythm, this diurnal rhythm that we found, which is you hit this low point two hours before and then, as I said, if you keep somebody in bed for an extra couple hours, it's very vivid. We thought it would continue to go up after you awakened, but there's a third process that seems to inhibit that whole REM thing that kicks in. Whether that cycle you're talking about, what we would call this third process, inhibits that activation or not, I don't know. But it's an area of research that we don't—we need to follow it up. We don't really know. In those days 10% of the NIH budget went into dreaming. And now it's zero. So we can't do those studies anymore.

But I was going to ask a question related to this. One of the things that we don't know about night dreaming—or daydreams—that would be nice to know is any of the sequence of the regions of activation. In perception, we know you see a visual perception, you start in V-1, and you move forward as you abstract and respond. We don't know whether you're starting in V-1. Do you start with the visual imagery and then interpret it as an object? Those dots must be eyes, therefore it must be a face, therefore it must be somebody. Or if you take the psychoanalytic point of view, you always start with the drive, the motivation, and then create a story. Those are actually two opposing scenarios and we don't have any data at all to remotely tell them apart. It's now possible to do it with fMRI.

Mason: I'm not sure if you could do it with fMRI, actually.

Antrobus: You could at least do it and see if there's some lawful movement from one region to the other. It may be just back and forth all the time. But you can do it. It's very noisy to go and lay in one of these machines, by the way. It's one hell of a noise. But if you do it all the time, you can fall asleep real fast, I'm told.

Mason: Well, yes. I think there are some techniques that look at timing issues with respect to when one brain region comes online. So they use something called MEG. But it's only very good at doing surface areas. It's not very good at medial regions. So sure, for the visual cortexes that would work, but there are a lot of regions that I think are involved in daydreaming that are kind of on the medial surface. So you can't really assess those. But I think conceivably there are patients with certain lesions or with damage to certain brain regions and I think it would be interesting to look at the relationship between a lesion in some region and what their dreams or daydreams are like. There is a lot of work on patients in a persistent vegetative state.

Antrobus: In what?

Mason: Patients in a persistent vegetative state. There's a man—I think he's German but I'm not actually sure—who's done all this really interesting work. He was able to scan someone using PET, which is slightly different than fMRI, immediately after the person lost consciousness. This individual actually regained consciousness. What he found was this regaining of

consciousness—being aware of the environment, but also of yourself—was associative with changes in this network that I would say is involved in daydreaming.

Singer: Let me open this up to questions.

Audience: I have a question for Dr. Mason. You mentioned about daydreaming, for example, that it helps us cope with certain things and take our attention away. I was thinking, how are the daydreams in that way related to the flashback in PTSD. While we are doing certain tasks in an environment and are focused and all of a sudden we get a flashback and it distracts us, and rather than helping to cope, we get more anxious. Would you consider flashbacks as kind of daydreaming in certain ways in that it's not related to the immediate environmental stimuli?

Mason: The way that I feel that I've operationally defined it in my own research, I would consider a flashback a daydream. It's sort of like a spontaneous memory of something. Perhaps it's triggered by some external cue. I think looking at current concerns, perhaps they're chronically aware, on some level, of this thing that they're struggling with and something in the environment triggers it and then they have a daydream. But I would say that as far as my research suggests, that qualifies as a daydream. There would be some similarities.

Singer: Let me just follow that up. I agree with that, and what I also think is very important is that as we're going through our day and we get some of these fantasies emerging—we have actually done research to show that, if it's like a strong visual image, which many PTSD situations are, you are temporarily in another place. You even stop looking—things happen in front of you and you don't notice them because your ocular system is caught up, in a sense, in looking at the daydream. But what that also does is it's like suddenly watching a bad movie that's scary and you increase the level of anxiety. So you're really trapped very much by the recurrence of these thoughts and then the follow-up is the extreme anxiety, which often you can't understand because it happens so surprisingly and suddenly. You know that of course it's related to your war experience, or you're envisioning some terrible accident or something like that, but you're essentially moving into another temporary environment, which I think is an important part of what happens with many daydreams.

Audience: Yes, as somebody with PTSD, I would agree with certainly a lot of that. There are issues with hyper-vigilance of things. The only way I could see it being daydreaming is in that, because you're primed with that kind of hyper-vigilance, it winds up being some kind of avoidance would come in with the concept of daydreaming, in terms of dealing with issues and planning and things like that.

I'm just a normal civilian, but I did go back many years later to get my undergraduate degree at Columbia and I did do some neurology and one or two graduate courses and that kind of stuff. One of the things I read about recently that I thought was fascinating was when they were doing rats and they were doing hippocampal experiments dealing with memory. What they were finding was that if you took the nerves that were firing during the course of running the maze, that at nighttime during REM, there was an exact replication, but in reverse. And somebody had come up with a theory—

Antrobus: In reverse?

Audience: In reverse, exactly. They were played back in reverse order during the dreaming process. You know, starting from the end and then working backwards was what I had read. But one of the things that somebody I thought had attempted to come up with for a potential application for humans on that was that at the most immediate level, when you get this kind of nerve firing, you wind up having an exact replication of what your experience was that day, which could tie in with the survival mechanism purposes. You know, you're reviewing what happened and what might be of import to you in the future and the brain tries to consolidate that. But what this one particular person—I don't recall the name—said was, perhaps you start with that immediate level of replaying the day's stimuli and then throughout the course of further REM sleep, you wind up making it more personalized. One of the things that would be fascinating, as you were suggesting, and perhaps resolve some of your questions with one another, is if they could make a connection between the different parts of the brain that fire at different times during the evening. I don't know how much of that actually applies to what goes on during REM sleep. But if you could make the connections, for instance, either during the cycle itself or else during the whole process of an evening's rest, if you could figure out which areas were exactly firing in association with one another, that might have a particular application on the significance of the dreams themselves. Especially perhaps having woken up and then going back to sleep, when things are move active in general, perhaps having greater associative value. But it seemed like a fascinating concept, trying to measure which areas of the brain were actually firing and in which order, and perhaps if that sequence varies during the cycle of alertness or else during the night itself.

Antrobus: Well, in nearly all the consolidation literature, the process with hippocampal interaction is in non-REM sleep. I don't know this study that you've told me about, but one of my graduate students, Dr. Walmsley, who's now in Boston, would really like to find some relationship to see how REM sleep is involved in consolidation theory. But let me tell you, it's one big uphill battle. There's very, very little evidence in the mental literature because the dream sequences are so distorted relative to anything that happened in the waking state. But in non-REM, with the rat, you can walk the right to left direction and it's the same way it is in the waking state—in non-REM sleep. All the consolidation literature that I know of is non-REM.

Audience: There's no connection thus far with early REM periods with any greater degree of—

Antrobus: Well, you know they're very short. They're only about ten minutes.

Audience: Okay, but during that time, is there any connection with perhaps a greater concreteness in some of that stuff, i.e. you're more concrete because you're just literally playing the immediate stimuli of the day versus later on, when it becomes more associate with personal components. It's a thought.

Mason: Bob Stickgold—he's somewhere in Boston—studies dreaming. He did this famous study where he basically took people and showed that they incorporated Tetris into their dreams. So they started to talk about, you know, "I see shapes moving." There was sort of departure from reality, but having known that the individual was playing Tetris all day, one would still be able to

recognize, “Okay, they’re playing Tetris in their dreams.” He’s got a lot of really interesting work looking in problem-solving and incorporating things that have happened in the previous day into people’s dreams.

I also actually wanted to throw this idea of incubation—I’m not sure if people are familiar with this idea, but this phenomenon where you’re playing a crossword puzzle and you can’t come to the answer, so you put the crossword puzzle down and then two hours later, you suddenly have it. I think this happens with dreams, too. There’s kind of a big debate. Is it that you’ve adopted a different strategy, a more optimal strategy, or have you been covertly working on the problem the entire time? I know I have woken up in the middle of the night and I realize that I’m coding a script and I’m particularly likely to notice it if it’s in a symbolic language, for example.

Antrobus: Well, the third alternative is that you’ve just broken the set.

Mason: That I’ve what? I’m sorry.

Antrobus: That you’ve just broken the set. You’ve been in a rut all day and you go into REM sleep and you break out of that rut that you’ve been in and it allows you to see something new that you didn’t see before. That’s just my take on it.

But if there’s a consolidation—put it this way, the underside of it is that if you spend all your life really fascinated about dreams and they’re not worth a damn and they don’t do anything, it’s very unsettling. So a lot of us are looking for a reason just because we want to justify what we’re doing. Look up Walmsley’s website. I’m sure she’ll have some stuff on this. One of my thoughts might be that one of the things you see in the REM sleep is a fair bit of what you could call ‘affect-related’ or ‘goal-directed’ stuff. Not so much the consolidation of real actions, but possibly an emphasis on things that are significant to you. I’m thinking down here of amygdala, goal-related stuff related to possibly the prefrontal cortex. The brain can do an awful lot of things, and there’s nothing coming in, so there’s got to be some selective aspect, which is your idea about goals, which I believe plants have too, but we have them more articulated. That’s what’s maybe happening in REM sleep: it’s emphasizing what’s important as against what’s not important. But that’s just guessing. We don’t really know. We don’t have any idea, other than psychoanalysts, who can use them to understand what the person’s all about. You tell them the story and it allows you to get inside of somebody because they think, “I wasn’t responsible for that dream, so I’ll tell you about it. And now you can figure out what I’m like.” But the actual function of the dream itself—I mean, it may be simply that we don’t have a switch that turns us off and on and we can’t wait until the light comes up like a reptile. Our nervous system turns on by brain stem-related cycles and it may be just some way to keep tonus up of different parts of the cortex. Who knows? I mean, if you left all those neurons dead for twelve hours, they’re not going to be in great shape in the morning.

It may be that you alternate—but that’s all speculative. It’s all based on the fact that the earth turns around once every 24 hours and we didn’t adapt to work equally well in light and in dark. Most organisms are good for one or the other. And maybe this is just what the organism does to get it ready for the waking state.

Klinger: This is all very interesting. Let me just point out something else that happens in sleep—and in daydreaming, too, to a certain extent—which is that when you’re not directing your thoughts, you’re not working with trying to achieve a certain goal, your thoughts have a certain kind of freedom. My thoughts—I’m including images and visual components—have the freedom to merge, so that if you have, for example, several cues operating and you’ve got images that might be evoked by two or more of them, they can merge, especially at night, in dream imagery. One of the things about over-determination is that any one image may reflect a number of different influences, and that includes the result of a number of different cues. That happens less extensively, probably, or less often in daydreaming, but it also happens there—in fact, about 20% less, on estimation. About 20% of daydreams are rated as “dream-like” by dream researchers. So you get the possibility of fusion and the absence or the reduction of constraints in what you dare to think because you’re not daring any deliberate way to do it. You can get combinations of imaginal properties that do, to use John’s term, “break the set.” But they give you the possibility of new combinations of things that probably make creative thought possible, or at least are one of the important things that make creative thoughts possible. That then gives you another function for both daydreaming and night dreaming: that is, this combination of these things.

I mean, there are these classical stories—Archimedes stepping into his bathtub. You know the story? His king has just given him an assignment finding out whether a certain very elaborately sculpted crown is made out of pure gold. But you can’t melt this down and weigh it as a block because it’s this piece of art. So what do you do? Archimedes is worried about this and thinking about it and afraid that he’s not going to satisfy his king’s desire, which is dangerous. But he steps into his bathtub and he notices as he steps in, the bathwater rises from one ring to the other. Fortunately, he doesn’t clean his bathtub very often. So the water rises and he suddenly has this thought: his volume is reflected in the rise of the water. So now he can measure the volume of this intricately carved crown, and then he can figure out whether it’s gold by weighing. Now, that’s something that occurred to him in a moment when he had not the slightest intent to think about that crown. But it occurred to him in this way. And then there’s the Kekule discovery—

Singer: Oh, there are many examples.

Klinger: There are many examples. Yes. I won’t regale you with all of them. But they occur at points when the person isn’t trying to solve the problem, and it does involve a combination of visual elements that would not ordinarily go together, or associations that would not ordinarily go together. So there’s a creative function, here.

Audience: Going off that idea about when you are using daydreams and fantasies to try to solve a problem. Using daydreams, or fantasies in particular, as hypothesis testing: “Well, what if I said that, then maybe they’ll say this.” Or your fantasy about the football player is like a practice relationship as you move towards being of the age to engage in the actual problem.

Singer: Could I respond to that quickly? How much time do we have?

Oppenheimer: We have plenty of time.

Singer: I'd like to put it into this context: I think that during the day we're constantly having all kinds of thoughts that we play with. Sometimes they're related obviously to our unfulfilled needs; sometimes they seem less so. But we're doing much more of this than we really are aware of. We know this now because there are many, many studies of people carrying beepers around with them that go off randomly during the day and we know the extreme extent of such kinds of seemingly random thoughts entering people's minds. But if you're a person who has some overriding major goal—that is, to make a discovery of some kind in physics—then these thoughts will be coming up in various ways. They'll get interrupted by other people. Many writers report they do this: they write down many of the fantasies, even though they later forget they had them, but they've got them in a notebook. Some people are doing this all the time, and if people happen to have a particular skill in a field like physics, these random thoughts keep coming up. They often are not thought about very much more, but then they come up again, and then they can be used suddenly. It seems like some muse has appeared and interfered or it seems like an intuition, but in reality, it's a prepared mind already in a field that then gets a thought and it just happens to be the right time to use it. In the case of Archimedes stepping into his bath, he noticed something happening and that he could tie it back in with something he had really spent a lot more time than he may have even been aware of in thinking about. So I think that goes on an awful lot of time.

I think in terms of relation to dreams, I happen to be at an age where I do have to go to the bathroom a lot more at night than I would like to. It's true. I get up more at night, and the result is that I remember more dreams. I wish I would write them down, but I haven't done that. But what I've been able to see is an awful lot of my dreams relate really much more to what Freud called the "day residue." That triggers an awful lot of what my thoughts are. And I know—because I'm pretty sensitive to these things—that I thought about them during the day. I noticed something, a face that reminded me of another face of an old friend or a dead relative or something like that, and that's more likely to come up later in the dream. Sometimes it comes up in a very profound way; other times it's just a passing feature of the dream. But this day residue, I think, is really more important than Freud gave it credit for. He was hoping to find unconscious drives related in some way to early childhood sexuality, and you can do that only if you look at each dream that's reported to a therapist as a Rorschach, really, in which you get to play over and over again. But in reality I think that we're constantly preparing ourselves, and it depends on how important these things are, how we're going to use them later on. In therapy, I think that what we're doing in a subtle way is training patients to be more sensitive to the ongoing stream of their own thoughts and to ways of interpreting them. Sometimes perhaps only in a way that reflects the analyst's particular theoretical position. But often it's way that can be really helpful to people and we can learn to use that practically.

Klinger: You're asking how you can use fantasy in a problem-solving fashion. I think it can be done, but you have to be very careful about how you do it because if you knew how to solve a problem, if you have the tools for solving it consciously, you would just do it. If you want to use fantasy, that means you're kind of stuck on something.

Audience: Well, I always wondered if it would sort of lead you away from reality. Like, inevitably, as you're creating the fantasy, you're going to edge it towards what you want. If you take it as sort of a hypothesis testing, you're creating something that you want to happen. You

were talking about your idea that every input has five possibilities, and from that there are five possibilities. If you're starting to, through these fantasies that you've constructed, weight your idea toward that, it's almost leading you away from solving the problem.

Antrobus: Why do you say "away?" The brain may multi-task. It may be doing different things simultaneously, and this is the underlying, pre-fantasy process that can actually go on simultaneously or rapidly switching back and forth within fractions of a second. So low-level associations may hit something that's significant, because you've learned it's significant. Even if it's like you've got to remember to get the butter to come home tonight. Or you had a fight with your mother or whatever. If it hits that at random, that's going to then spring out and you'll actually see the rest of the brain start to get active. You'll see activation over all the parts of the brain that would be needed to deal with that in a more realistic way, not in a fantasy-way, likely. Unless you're driving a car and there's nothing you can do. I think it depends on if you're in a situation where you can actually realize a solution. If you're driving—like I used to commute for an hour—then there's nothing you can do. You go from one thing you can't do anything about to another. Only you stop and go because you can't do anything about it. You know, when something is automatic, the brain can do something very well with only utilizing a small part of the brain resources. Just a small part of the brain needs to be used for understanding the words I'm saying. When you get older, you actually have to use more of the brain to do the same kind of thing you did when you're younger. That's what you have to look forward to. It's probably true for any kind of problem—if it's significant. That's why I think the medial prefrontal cortex alerts when things are significant. The kinds of things you talked about—the actual objects and events. If something posterior to that activates that, then it's going to activate larger regions of the brain to give a more realistic solution. You're not going to have an unrealistic solution if it's going to lead you to your death. You do things that help you survive, for the most part.

Klinger: You have to remember that there is this kind of guidance mechanism set up by your goal structure, and if you're trying to solve an unimportant problem and you have way more important things on your mind, then sure, your fantasies are going to take you in those other directions and away from working on the less important problem. But by and large, you're going to stay on track if it's an important problem. But the "track" mustn't be pre-designed by you consciously because then you lose the value, the creative potential, of the fantasy. I played for a while using with Leuner's Guided Affective Imagery and I was amazed at the robustness of the waking dreams—the guided daydreams or waking dreams—that you can initiate in a deliberate way. But then you have to give them free reign and they will work over the person's really important problems and often come up with interesting solutions in a visual kind of way.

Person: One of the things that help people remember is how differently they remember. I mean, I have friends who are musicians who always have music running in their head. That's very different than what some of us do when we're thinking in words or trying to solve a problem or remembering a past event. So I'm very skeptical of too many overall judgments. I think that you only really know how a person is thinking when they tell you, in some real way, about the mode of the thought, which may be abstract. It may be pictorial, it may be in words, it may be in stuff just popping up. I just feel that you never know that with anybody unless you really ask them.

Audience: I'm a student in cognitive science. I've been hearing "attention" a few times, which I think is crucial to conscious awareness. The term I wanted to introduce being "attentional set," as one that maybe could be applied here as something that is both an instantiation of your local goal—the task you're actually engaged in—as well as your broader goals as defined by biology—an instinctive desire or need to pay attention to red motion, or things like that. That thought actually hit me because there was an idea that three times as much content is generated in dreams—this was a statistic you mentioned—if they were goal-related. So I was wondering if we can talk about attentional sets and, say, daydreaming, as thoughts that enter consciousness due to broad attentional sets that might go past your current task and as a result, sneak into your conscious awareness. And use this term both to be able to talk about statistics about night dreaming as well as statistics about daydreaming and thoughts entering your head. And also then be able to use this term to be able to talk about how daydreaming or night-dreaming could help solve problems because, say we have a problem and then we move on to something else, we might instantiate that in our attentional sets. So we're not engaged in that problem anymore, but our attentional set has instantiated that this is an issue that we wish to direct our attention to. So that then in the sort of diffusive thinking that occurs, your attentional set will capture that when the moment is right and direct it to your consciousness, so you can have that moment of eureka. This was a question of the power of such a term and whether it would be something that could unite three different aspects of this conversation.

Singer: Malia wanted to say something.

Mason: I'm not sure if I want to say anything, but I think that sounds brilliant, actually. It does make me think a lot about how sometimes we start daydreaming precisely when we don't want to be, and I think it happens a lot when we're confronted by some task that we can't actually do. I saw some links in terms of that. Jonathan Schooler and Jonathan Small—I'm not sure if you're familiar with their work at all, but they have a lot of research—they talk about mind-wandering, but essentially they mean daydreaming, too. Maybe we mean mind-wandering, but they make a distinction between when people are aware that they're mind-wandering and when they aren't aware and then they suddenly catch themselves mind-wandering. I actually think it's very important. I think that everything that I've done can be re-couched in terms of attention. So again, I feel like I argue that this default network is associated with producing—I say 'experiencing'—these thoughts. But really, I think you could talk about this network in terms of attention and attention fluctuating. My one thing is attention is such a nebulous term. I mean, I'm saying attention, you're saying attention, but I'm like, what do you mean?

Audience: Well, I think "attentional set" helps us, in some sense. You know, there are people who have tried to narrow it down as sort of biasing networks.

Antrobus: Well, what do you mean by it? I don't know what it means. It's considered a field of study, not a process?

Audience: Attentional sets?

Antrobus: Attention is considered a field of study. It's not a process. It's a word we have that we got from the vernacular, which has very little value in science.

Audience: But attentional sets have a capacity to give us a term to talk about the biases, so that when the competition between stimuli occurs, there is a certain biasing. So that not the brightest stimulus is the one that will enter my conscious awareness because I can bias it, say, for example—

Antrobus: There are 30 or 40 places where the biases could occur. But you're talking about the frontal cortex sort of saying, "I want to do this." It controls about three different things that it can determine how resources more posterior to that will be given priority to process. That would be one kind of attentional set, possibly, but it's not a single thing. It really isn't. We could end up playing a word game, here, I'm afraid.

Klinger: No, I think attentional set is a term that's used for prioritization, for processing prioritization in the cognitive stream. And you can think of it probabilistically. Biasing is the probabilistic process. But that's exactly the kind of thing that I meant when I said that the current concern that's set off when you commit to a goal sensitizes you to cues. Attentional set would be another way of saying that. And I think that's a very important thing.

Audience: My name is Karen Rude. Dr. Klinger made a differentiation between fanciful daydreaming and maybe stream of consciousness—what was the term you used?

Klinger: Mind-wandering.

Audience: Okay. That to me seems quite different. Virginia Woolf described stream of consciousness, whereas I'm sure I'm not the only one who's had elaborate fantasies, say, rehearsing someone's death that I care about or even like my own funeral or something. You wonder what the heck that is about. They're very elaborate and you can get very emotional about it. So I wonder if you could talk a little bit about that differentiation. I know you've alluded to it a lot in the conversation, but kind of go more into that.

Klinger: Well, I don't see them as opposites or anything like that. I see mind wandering simply as a process of spontaneous thought that you don't do anything with except that it occurs and it may be enlightening, but that's not the point of it. Or at least not why it started. And then how fanciful that is can vary. So we're talking about two different dimensions of thought. And when I originally said I'll accept spontaneous thoughts or fanciful thoughts as daydreaming, I was saying that's how people tend to think of daydreaming, as one or other or both. But I didn't mean to state that these are categories that are different from each other. Rather they're two dimensions that are different from each other. The same thought, for example, can be spontaneous and very humdrum or it can be spontaneous and very fanciful. And a fanciful thought could be spontaneous or it could be deliberate. Sometimes, for example, when people were getting ready for battle, at least in the old days, they would engage in fantasies deliberately. They'd launch themselves into fantasies about the awfulness of the enemy so that they could work up their level of hostility.

Audience: Is that daydreaming?

Klinger: Well, I wouldn't define it as mind wandering, but it's a kind of fanciful thought. Or it could be, if it is in fact fanciful. Then it could certainly be considered a kind of fantasy and therefore sometimes considered daydreaming, especially if you let it run. If you don't pre-specify what exactly form it's going to take, but you simply say, "I'm going to think about this war and what I will do to my enemy and what that enemy is likely to do to me," and then you let it run—once you've let it run, it becomes daydreaming.

Mason: Do you commit a goal to not think about it? When you imagine your own death, do you say to yourself, "Why do I do that? I shouldn't do that."

Audience: No. It seems different to me from, "Oh, there's so and so. That makes me think about the book I need to get from the library." It's a much more elaborate experience and it has a lot of emotion.

Person: It's emotional, and that's really what it's about.

Klinger: Yes.

Person: That comes and then sets the frame for it. I think that's important.

Klinger: We know a lot less about the fancifulness dimension of thought flow than I think we know about the sequencing and mind wandering and so forth. So that's a research area ripe for work, except it's hard to get at.

Person: It depends on your profession. If you're a psychoanalyst or a psychiatrist or a therapist, you're very interested—

Klinger: Oh, interested, yes. I'm thinking in terms of systematic, quantitative research. There's a lot less on it.

Person: In some ways it becomes a systematic research because you tie things to what that person is about. So it may not be scientific from your point of view, but it's critical in what most of us, or many of us in this room actually do.

Klinger: Oh, sure. Clinical knowledge.

Person: No, it's not just clinical. It's too small a word because there are therapists who have it and therapists who don't have it. It's an emotional connection with what somebody is saying to you. You're not just playing with the words, but you're playing with what you feel is going on in them emotionally that gets you there.

Audience: I'm a retired attorney and I'm also a member of the Board of the New York Psychoanalytic Foundation. I really want to derive the practical aspects of daydreaming. I haven't been able to get one aspect of Dr. Singer's football fantasy out of my mind and, if I understood it correctly, not only did you create the games, have players in the games, but in effect you began to rank teams, rank players, and almost begin to keep records.

Singer: Right, exactly.

Audience: To me, that in a way goes beyond the issue of it being a goal, but basically exercising a skill, perhaps a human skill that we need, and at the same time a way you ultimately approach your own work. The other practical thing that came to my mind is the idea that a lot of our daydreaming is in a way gaming. In other words, we're thinking about things that are likely to come up in our lives and we're working them through and we're presenting ourselves with different scenarios. The question there is whether or not that's really daydreaming. Or is that just thinking?

Singer: Well, I would have to say that we're talking really about thinking, and daydreaming is one feature of ongoing thought. I think that human beings generally can stay focused on a real problem for only very limited amounts of time, particularly if the problem has abstract properties, like a mathematical problem or a money problem or something like that. You can stay focused on it only for very limited periods of time and then you find you drift away. It's a very difficult form of thinking. So I think that the daydream is a default state in a way when you've reached a certain limit of how much you can think about one very specific thing or one scene in front of you.

To follow this up in terms of your reference to my fantasy, I have to say that I didn't limit this to just football. I had a whole different set of characters in baseball. At a certain point, though, someone gave me a little mechanical game. Not computerized at all. Nothing like that existed then. But it was a little game so I could involve my friends. We all made up a league and the teams. We had a kind of a group fantasy, but we actually played it out as the game, with leagues and scores and we made up all kinds of teams with funny names. So the fantasy can have its element reaching out into some sort of reality.

Person: That's the way I generally understand them.

Singer: Yes.

Audience: Fantasy Football is a tremendous industry right now. You should have trademarked—

Singer: Yes, I should have stuck in that business.

Oppenheim: Just one more question and then we're going to have to call it an evening.

Audience: I want to congratulate Dr. Person for being way ahead of your time. When you describe what you did with that football player, I was wondering if you ever found out from him how he was imagining you before he met you. The reason I bring that up is I'm hearing a lot today about people doing exactly what you did; it seems to be much more common now. People, either through telephone, phone sex lines, or the Internet, making up whole identities about themselves, changing their careers from an attorney to a travel writer, changing their weight, their name, their religion, all kinds of things. Sometimes they create a kind of stable identity that

they then use with different people, but sometimes it's a kind of co-created daydream, which is kind of what you did with this man.

Person: Yes.

Audience: What I'm often amazed at is that even when people know that they're making up a lot of the characteristics of their identity, they usually presume that the other person is not. It happens over and over. It could just be the wish that that's the case. But I'm wondering if you have some thoughts about that.

Person: I think generally you're right. I think this was very early in my life and that what I was suggesting was useful for him. That's how we had this connection until we actually met.

Audience: Did he tell you—how old did he think you were?

Person: Absolutely not.

Mason: I actually have some friends who study Internet dating. They don't actually look at how people create this false identity, but they look at how people become really bad at assessing the likelihood that they're going to meet someone that they actually like. People spend an enormous amount of time on MySpace, on Facebook, talking to these people and thinking, "Oh, I have a million options. Look at all the pages I have to go through." Then they go for a cup of coffee with somebody who they don't like. So they've had an experience in the world and they disregard that experience and they believe what they want to believe. I think the Internet is kind of ripe for contributing to that and letting people fantasize about "Oh, my options are fantastic," when actually they're not.

Person: But sometimes they are.

Mason: Well, let's talk afterwards.

Person: It's like being a gambler. If you're a gambler you sometimes lose and you sometimes win.

Mason: In the moment, I think they find it really rewarding. Like they really enjoy doing it. But the extent to which it actually may be as successful as a partner-finding strategy—

Person: Do you know how many marriages have come about?

Mason: I'm not saying it's a bad thing, I'm just saying research has shown that people spend a whole lot of time on these Internet sites for a cup of coffee.

Oppenheim: We have two people that are really eager, so we can do one and then two and then that's really it. Before anyone else walks out of here, I want to let you know that these people's books are for sale, right on this floor, right outside this room.

Audience: I had the good fortune to be a laboratory assistant in the little lab that had been semi-vacated by Dr. Antrobus last spring. And I admired your paintings, but I did not like the plants that were not tended to after you left. The difference I distinguish between daydreaming and REM sleep—night dreaming—is the lack of selective attention. The attention is not there because we don't have any incoming stimuli that we really have to process. I was wondering if anybody has done any work with fMRI to look at the difference in the prefrontal, frontal lobes, and anywhere else, in terms of activation between conscious daydreaming, where we do have to attend to incoming stimuli, and night-dreaming, where our frontal lobes can just be in a Z zone.

Antrobus: Well, there's been very little work. The only work that I know of is Braun's work in 1989 or '90. It's very hard to keep somebody in the machine. Actually, he used PET, I think. So it's very early REM sleep; it's not very typical of the later REM sleep and it doesn't get the early morning stuff that's really interesting. He had the controls before and after, and I don't know that he measured fantasy in particular, but the waking state, the control states. His major finding was that the regions of the cortex are activated in REM sleep. They're just not interconnected as well as they are in the waking state, which is something I started with earlier. So it allows one part of the brain to say, "That's a girl, but it's my brother," because the regions don't talk to each other. They don't constrain each other as well as presumably they do in fantasy.

I want to add that I'm a bit of a skeptic in all of this stuff, so I hope I don't give too much of that to you. There's a problem in all of this discussion: we're using words that were invented before any of the psychology and science were around. We're using words that came to us in the vernacular and they have a massive order of crudity that is not suitable for any serious discussion here, as far as I'm concerned. We're trying to dump things into words that were invented 300 or 400 or 500 years ago. We know a lot more about processes now. You have to look at the detail of these processes and the words—"consciousness," and so on. There's no such thing as just "consciousness." Again, it's a field of study. There are lots of kinds of consciousness. The things you can stick into words or the things you could say—"I'm going to do this and I'm going to hold onto it." What does it mean to be conscious? I mean, we can't answer these questions until we have more detailed measures. And we do in the lab, but it's hard for us, in this venue, to communicate what we mean by all these processes.

But I think that interconnectedness is a piece of it. I also think the REM sleep is one kind of activation, with the motor system and the proprioceptive input. It's wild fantasy and you believe it, but the dreams that most of us are talking about are the late-morning dreams, which are another source of activation that does not include that inhibition. And then you begin to look at your dream and see and talk about it and that's where the lucid dreams come in. You can actually try to maneuver your dreams, which is what you people have been saying only occurs in your fantasies. You can do it in your dreams, too. So, as more and more regions of the brain become active, say around 8:00 in the morning, if you stay in bed that long, then you can do other things. Your dreams change in their quality. So there's not just one kind of night-dreaming; there are lots of kinds. I don't know if that helps.

Audience: I'm in the process of writing a book on innovation and innovative thinking, in particular personal innovation and social innovation and the applications that are very relevant to everything that you're talking about. I have about 100 questions, but I'll only ask one. You can

make it brief by just sort of giving me references to studies or authors or books or what have you, to do further research, but I'm really fascinated with one or two things that John said early on with regard to stimulus and response and the complexity of how we deal with the natural process of thinking and adjusting our thinking with regard to stimulus and response. There's a famous quote by Victor Frankel. I'm not sure how many people know of it, but he was sort of popularized by Steven Covey in one of his books. It had something to do with—I'll misquote it terribly, but it's something of the order of, "In between stimulus and response, there is a space and in that space lie all the world of possibilities for us to control and determine our outcomes." That has become a fascinating area of further study, such that I am looking into how that space in fact can be used for creating a conscious level of decision to innovate, to create and value in the simplest of scenarios. I'm wondering if you can refer to certain differences between the stimulus that is more a knee-jerk reaction, that which you simply respond to without thinking consciously, rather than the type that you might respond to as a result of a broader context, a broader set of values or principles or passions or things that you've made a decision about, in terms of your life's priorities. If you are responding to some stimulus—the thought might be, let's say a bigoted thought, or something where you're politically incorrect by thinking it, but at the same time, at a conscious level or a broader level, you think, "Wait a minute, that's absolutely not the right way to be thinking. I would much rather respond in a more cerebral, passionate way." If you could respond to that—

Singer: Well, I just want to suggest that from the standpoint of clinical work, if you look at what clinicians are doing, whether it's in psychoanalysis or Rogerian kind of therapy or many forms of behavior therapy—cognitive or cognitive-behavior therapy. It turns out that what the therapists are doing—and I have examined that across a lot of different therapies—is training their patients to be doing something along the lines of what you were just suggesting. That is, to be able to get control of the seeming randomness of their thoughts and begin to play with them in various possibilities, and to also use their own imagery capacities to guide their fantasies into a variety of ways. I like the term "an attitude toward the possible." What is possible? Initially, it can be rather fantastic and you see yourself shooting off into space. There's a certain well-known scientist who imagined himself, even as an adolescent, shooting out into space and thinking what it would mean to shoot out in space faster than light. You might guess who that was. He talked often of similar kinds of fantasies. In a way, we are, sometimes unwittingly, training our patients to use their capacities for imagery, for imagination, and focusing them in various ways. Sometimes the theories differ enough so that you might lead the patient into a particular direction that might even not be so helpful. But most of the time I think most therapists are reasonably sensible people and there is a kind of overlap between the different therapists in the way they're guiding patients into thinking more systematically about their own capacity to use their natural imagery and natural daydreaming, you might say.

Klinger: We're out of time, but the question about drawing on the broad range of your interests and values and so forth versus not—go look up stuff by Julius Kuhl and Miguel Kazen. Kuhl has a theory that mostly is in German, but there are some good English versions of it. Kuhl and another author have a chapter in the *Handbook of Motivational Counseling*. That's Cox and Klinger, editors. *Handbook of Motivational Counseling*. And Kashke and Kuhl have a chapter in that in which they describe the theory and give you a lot of references to other places. But then in the *Journal of Personality and Social Psychology* and the *Journal of the Experimental*, Kuhl and

Kazen have important empirical work there. You might also want to look at stuff by Oettingen, with other authors, mostly in the *Journal of Personality and Social Psychology*, on the nature of daydreaming—the extent to which the person looks at an imagined end goal, wish fulfilling kind of thing versus looking also at the realities in the daydream process and the effect of that on reaching a goal. Those are good places to look.