LUCID DREAMING AS A

PROBLEM-SOLVING

METHOD

by

Michael F. Smith

LUCID DREAMING AS A

PROBLEM-SOLVING

METHOD

Project Approved:

Supervising Professor: Timothy Barth, Ph.D.

Department of Psychology

Brenton Cooper, Ph.D.

Department of Psychology

Richard Hine, Ph.D.

Department of Philosophy

ABSTRACT

A lucid dream is defined as a dream in which the dreamer – while dreaming – is aware that he or she is dreaming (LaBerge, 1985; Schredl & Erlacher, 2004, p. 1463–1473). After realizing that they are in the dream state, lucid dreamers are able to remember waking memories (Erlacher, 2009, p. 37-40) and consciously influence the action occurring in such dreams (Tholey, 1981, p. 21-32). With these abilities, lucid dreamers are able to critically engage problems they would normally face in their waking life while in the highly associative state of REM sleep. This potentially allows them to look at their problems from a different perspective as well as come up with solutions that would typically be out of their mind's immediate awareness. Due to these features, lucid dreaming has the potential to serve as an effective problem-solving tool. However, if it was to be used in this way, what system of thinking would it fit into? Dual-process models come in many flavors, but all distinguish cognitive operations that are quick and associative from others that are slow and governed by rules (Gilbert, 1999). System 1, or the Intuitive System's processes, are characterized as automatic, effortless, associative, rapid, parallel, process opaque, and require skilled action. System 2, or the Reflective System's processes, are characterized as controlled, effortful, deductive, slow, serial, and require self-awareness and rule application (Kahneman, D., Frederick, S. 2002). This paper will discuss why lucid dreaming should be explored as a problem-solving method as well as how System 1 and System 2 thinking are involved in this process.

TABLE OF CONTENTS

INTRODUCTION

A lucid dream is defined as a dream in which the dreamer – while dreaming – is aware that he or she is dreaming (LaBerge, 1985; Schredl & Erlacher, 2004, p. 1463–1473). After realizing that they are in the dream state, lucid dreamers are able to remember waking memories (Erlacher, 2009, p. 37-40) and consciously influence the action occurring in such dreams (Tholey, 1981, p. 21-32). With these abilities, lucid dreamers should be able to critically engage problems they would normally face in their waking life while in the highly associative state of REM sleep. This allows them to look at their problems from a different perspective as well as come up with solutions that would typically be out of immediate awareness. Due to these features, lucid dreaming has the potential to serve as a problem-solving tool. However, if it was to be used in this way, what system of thinking would it fit into? The ancient idea that cognitive processes can be partitioned into two main families – traditionally called intuition and reason -- is now widely embraced under the general label of dual-process theories (Chaiken and Trope, 1999; Hammond, 1996; Sloman, 1996). Dual-process models come in many 'flavors,' but all distinguish cognitive operations that are quick and associative from others that are slow and governed by rules (Gilbert, 1999). System 1, or the Intuitive System's processes, are characterized as automatic, effortless, associative, rapid, parallel, process opaque, and require skilled action. System 2, or the Reflective System's processes, are characterized as controlled, effortful, deductive, slow, serial, and require self-awareness and rule application (Kahneman and Frederick, 2002). paper will discuss

how and why lucid dreaming should be explored as a problem-solving method as well as how System 1 and System 2 thinking are involved in this process.

<div align="center">DREAMING</div>

Even without lucidity, dreams themselves have been known to have a profound effect on creativity, one of the main contributors to effective problem-solving. Barrett (2001) and Van de Castle (1994) described many examples of this phenomenon. For example, artist Salvador Dali claimed that dreams stimulated his work. Similarly, filmmakers such as Ingmar Bergmann (*Wild Strawberries*), Carlos Saura, and Federico Fellini directly transformed their own dream images into film sequences. A famous example is *The Strange Case of Dr. Jekyll and Mr. Hyde*, by Robert Louis Stevenson, who dreamed about this metamorphosis from one character into the other. Paul McCartney heard the melody of the song "Yesterday" within a dream and could not believe it was a yet unknown song (Schredl & Erlacher, 2007, p. 35-46).

In addition to the creativity of artists, dreams contribute to problem-solving in science. Auguste von Kekule discovered the ring structure of the benzene molecule by thinking about a dream in which a snake seized hold of its own tail, although this report is subject to doubt because Kekule reported the dream long after its occurrence (Strunz, 1993, p. 281-294). Other dream solutions have been reported for Dmitri Mendeleyev's categorization of chemical elements, Elias Howe's invention of the sewing machine, and Herman V. Hilprecht's deciphering of ancient Babylonian hieroglyphs (Van de Castle, 1994). These are all anecdotal claims, however.

Despite the many famous examples of the inspiring effects of dreams, empirical research is scarce in the area of investigating dreams of people not selected for their creative abilities. However, a study by Schredl and Erlacher (2007) found that dreams that stimulated waking-life creativity played a considerable role in the lives of ordinary people – about 8% of all dreams. The main influencing factors were dream recall frequency and the personality dimension of thin boundaries (respondents with *thin* boundaries are described as sensitive, creative, and vulnerable; experience mental in-between states; and involve themselves quickly in relafionships). Participants can increase dream recall by keeping dream journals or using presleep suggestion about successful recall (Redfering & Keller, 1974, p. 268-271).

One possible explanation for how dreams contribute to creative problem solving is that they normally occur during REM sleep, which previous sleep studies have suggested contributes to the formation of associative networks and the integration of unassociated information. In a recent study by Cai et. al (2009), further evidence was gathered - through the use of primed Remote Associates Test (RAT) items. – in support of this hypothesis. In the creativity task (RAT), subjects were required to produce a word that is associated with three test words that are seemingly unrelated to each other. The exposure conditions were designed to access three different methods for creative problem solving. First, the repeated-exposure condition examined the role of incubation on creative problem-solving. Second, the priming condition tested whether priming of associative networks would improve creative problem solving with the primed items and whether REM sleep would

enhance this effect compared with NREM sleep or quiet rest. Last, the no-exposure condition examined whether general creative problem solving can be enhanced with repetition of the same task.

In the repeated-exposure condition, subjects were first tested on the RAT at 9 AM and retested at 5 PM. To compare sleep and the passage of time, subjects were administered the same RAT in both the morning and afternoon sessions. No differences were found between groups, and post hoc analysis showed that all three groups, NREM sleep, REM sleep, and quiet rest, improved similarly on the repeated items compared with the morning baseline performance. These results indicate that the passage of time (i.e., incubation) was sufficient to increase creative problem solving (Cai et al., 2009, p. 10130-10134).

In the priming condition, participants completed a set of analogies (e.g., CHIPS: SALTY; CANDY: S__) after the morning RAT in which half of the answers (e.g., SWEET) were also the answers to the afternoon RAT items (e.g., HEART, SIXTEEN, COOKIES; answer: SWEET). In contrast to the incubation results, subjects that had REM sleep displayed a significant improvement above NREM sleep and quiet rest groups. Strikingly, although the quiet rest and NREM sleep groups received the same priming, they displayed no improvement on the primed RAT items, whereas the REM sleep group improved by almost 40% above the morning performance. Furthermore, this improvement was found to not be due to a sleep-specific improvement in the consolodation of memories. To address memory in the study, recognition and cued recall were assessed for answers to the morning analogies during the afternoon session. Surprisingly, yet consistent with the incubation

findings, no difference was observed among the three groups (NREM, REM, and quiet rest) for any of the memory measures, including recognition, cued recaall, explicit, and implicit. Performance on these memory measures was not correlated with performance on the primed RAT items. Importantly, although all groups had similar memory for primed answers, only subjects with REM sleep promoted generalization of the analogy answers to new and useful solutions on an unrelated cognitive task (Cai et al., 2009, p. 10130-10134).

For the no-exposure condition, baseline assessments were measured on the morning RAT. In the PM session, subjects were tested on new RAT items. Surprisingly, no group (NREM, REM, quiet rest) differences were found on the new RAT items, and no improvement in PM performance above baseline was observed in the three groups. Although daytime sleep has been shown to improve performance on some cognitive taks and to increase alertness and restore homeostatic drive, neither NREM nor REM sleep improved general creative problem solving in the absence of prior exposure (e.g., priming) (Cai et al., 2009, p. 10130-10134).

Although REM sleep doesn't seem to enhance general creativity, the results of the study by Cai, Mednick, S.A., Harrison, Kanady, & Mednick, S.C. (2009) suggest that it is very important for the integration of unassociated information (Cai et al., 2009, p. 10130-10134). These results support the hypothesis that the brain is subconsciously spreading activation of previously activated nodes. Prior literature suggests that during a "dormant period" between two active encounters with a problem, the memory trace of a target item, and the progression of this target through other relevant stored information generate spreading activation through a

network (Yaniv & Meyer, 1987, p. 187-205). For example, by priming the solution SWEET before sleep, the SWEET node is activated, and during subsequent REM sleep, the associative nodes (in this case HEART, SIXTEEN, COOKIE) are more likely to be activated and increased above threshold. Therefore, when the three words that were previously unrelated (HEART, SIXTEEN, COOKIE) are seen, there will be an increased probability of the node SWEET being chosen as the solution. We propose that the most optimal dormant period occurs during REM sleep, which provides the most spreading of activation (Cai et al., 2009, p. 10130-10134).

If the above theory is correct, we might expect that a person primed before sleep with information related to a problem they wish to solve will come into contact with this information (and its relevant associations) at some point throughout the night (presumably during a dream occuring in REM sleep). The only caveat of this system is that this information would only be integrated into one's awareness at the unconscious level. If, however, one also happened to remember the dream (or dreams) in which these new associations were formed, they could integrate this information immediately into their conscious awareness upon awakening and be that much closer to solving their problem. The only issue that would remain is that these remembered associations would still have been built unconsciously and would therefore not have been under the dreamer's control. If, however, it were possible to become aware one is dreaming within the dream itself, one could actively search for solutions and work together with the unconscious in order to guide the association-building process in the direction most conducive to finding a solution. Luckily there is such a thing, and its called lucid dreaming.

LUCID DREAMING

A lucid dream is defined as a dream in which the dreamer – while dreaming – is aware that he or she is dreaming (LaBerge, 1985; Schredl & Erlacher, 2004, p. 1463–1473). After realizing that they are in the dream state, lucid dreamers are able to remember waking memories (Erlacher, 2009, p. 37-40) and consciously influence the action occurring in such dreams (Tholey, 1981, p. 21-32). Lucid dreams occur to a high percentage in REM sleep (Erlacher, 2005). The advantage that they have over normal dreams is that lucid dreamers are able to execute pre-arranged tasks while dreaming and mark the beginning and the end of each task with eye signals in the electrooculogram (EOG) recording.This paradigm allows precise matching of the dreamer's subjective reports with recorded physiological responses and is known as the "scanning hypothesis." Although not all the evidence points to a direct connection between the deliberately carried out dream gaze shifts (in lucid dreams) and the corrresponding eye movements of the sleeping body, a strong correlation measured by EOG has been demonstrated (Erlacher, 2005). Already in the first sleep laboratory studies about lucid dreams from Hearne (1978) and LaBerge (1980) eye movements were used to validate lucid dreaming. In those studies the lucid dreamers were instructed to perform specific eye movements in their lucid dreams (e.g. look left, right, left, right) which could be found in the corresponding EOG recording as up and down lines (Erlacher & Schredl, 2008, p. 7-14).

Lucid dreaming has many different applications. An online survey conducted by Schadlich & Erlacher (2012) which involved 301 lucid dreamers found that the most frequent application of lucid dreaming was *having fun* (81.4%), followed by

changing a bad dream or nightmare into a pleasant one (63.8%), *solving problems* (29.9%), getting *creative ideas or insights* (27.6%), and *practicing skills* (23.3%). All of these applications are useful, especially since lucid dreaming is a learnable skill (LaBerge, 1980).

Robert Waggoner – an avid lucid dreamer and well-known author in the lucid dreaming field – says that while

consciously aware in dreaming, one can see the creative impact of beliefs and expectations in determining the dream experience. The power of expectation is so prevalent, lucid dreamers routinely talk about the expectation effect, meaning the tendency for the lucid dream to follow the mental expectation of the lucid dreamer.

The expectation effect carries such importance that a lucid dreamer who suddenly changes his or her expectations instantly changes the experience of the dream. 'For example,' when lucid, if you expect to fly through a wall, you normally will fly through the wall. If you suddenly doubt and don't expect to fly through a wall, however, your new expectation will materialize, and you will most likely bounce off the wall.

I recall a lucid dream in which I was flying back through a wall that I had previously flown through. Suddenly, I had just a tinge of doubt about flying through it— just a speck. The result? I became stuck halfway through the wall! Just that little bit of doubt tinged my expectation, and my situation symbolically reflected my mental state. Hanging there in the wall, half in and

half out, I realized the absurdity of the situation, and proceeded to "expect" my successful passage through it.

So not only do you get what you expect, you get what you expect at the moment you expect it. Changing your mind, even slightly, changes the lucid dream experience to correspond to the minor gradations of your expectation.

When lucid, you realize that the expectation effect (and all reality-creating principles) acts as a self-reflective learning system. If you expect trouble, if you expect punishment, if you expect wrath, the lucid dream responds to your expectation with appropriate images and situations. If you expect love, if you expect joy, if you expect ecstasy, the lucid dream responds in kind. Your experience largely reflects your expectations, which come from your beliefs, thoughts, ideas, and emotions.

You could say expectations come in all shades of intensity, feeling, and depth. Expectations can be both simple and surprisingly complex. You can expect based on seemingly rational conditions; if A, then I expect B, or if A and B, then I expect C, and so on. While expectations appear simple, they emerge from the complexity of our ever changing personal belief system and shifting focus and can mirror that complexity.

Since you can use lucid dreaming to actively go beyond expectation, you ultimately realize that lucid dreaming is not entirely a self-reflective mirror of your waking conscious processes. In going beyond your expectations and allowing the unexpected, you open up to the larger reality and unknown creativity of lucid dreams (Waggoner, 2012, p. 115-116).

SYSTEM 1 AND SYSTEM 2 THINKING

The ancient idea that cognitive processes can be partitioned into two main families – traditionally called intuition and reason -- is now widely embraced under the general label of dual-process theories (Chaiken and Trope, 1999; Hammond, 1996; Sloman, 1996, Chapter 22 this volume). Dual-process models come in many flavors, but all distinguish cognitive operations that are quick and associative from others that are slow and governed by rules (Gilbert, 1999, p. 3-11). System 1, or the Intuitive System's processes, are characterized as automatic, effortless, associative, rapid, parallel, process opaque, and require skilled action. System 2, or the Reflective System's processes, are characterized as controlled, effortful, deductive, slow, serial, self-aware, and require rule application. These differences also apply to the content on which these processes act (Kahneman and Frederick, 2002).

Although System 1 is more primitive (evolutionarily) than System 2, it is not necessarily less capable. On the contrary, complex cognitive operations eventually 'migrate' from System 2 to System 1 as proficiency and skill are acquired. A striking demonstration of the capacity of System 1 is the ability of chess masters to perceive the strength or weakness of chess positions instantly. For those experts, pattern matching has replaced effortful serial processing (Kahneman and Frederick, 2002). This dual-system process might also explain something like the freestyling ability of rappers. For instance, when they are first starting it seems as if they're slowly thinking out each phase (System 2) but when they improve, their line construction seems to form on its own as if it were being guided by learned heuristics (System 1).

This seemingly 'automatic' quality of System 1 thinking is what makes it so special as well as advantageous in any situation where there is time pressure.

System 2, "which is usually associated with semantic memory, as described by Collins and Loftus (1975), operates at a more abstract level, is slower, and requires more cognitive effort. Students receive instruction in using this system in math (e.g., proving theorems), science (e.g., using the scientific method), and most other academic courses. In addition, most professionals use this system to deal with the complexity of their jobs. The construct of executive function (EF) has been used to capture the essence of analytic processing. Anderson (2002) indicates the major functions of EF are anticipation, goal selection, planning, initiation of activity, self-regulation, and use of feed-back (Dansereau, Knight, & Flynn, 2013, p. 274-282)."

Creativity is typically defined as the process of creating something both novel and useful (Amabile, 1996). The use of creativity in problem solving is important because when facing new challenges, new ideas must be generated in order to come up with effective solutions. Leung, et al. (2012) argue that although many different factors contribute to successful creative problem-solving, one of the most important factors is the use of *convergent* and *divergent thinking* (as cited in Guilford & Hoepfner, 1971).

System 1 and System 2 are very similar to divergent and convergent thinking. Divergent thinking entails the generation of many ideas about and alternative solutions to a problem (Guilford, 1967) while convergent thinking entails the search for the best answer or the most creative solution to a problem (Dewhurst, Thorley, Hammond, & Ormerod, 2011; Nemeth, 1986; Simonton, 2003).

Likewise, with System 1 and System 2, it is assumed that System 1 quickly proposes intuitive answers to judgment problems as they arise, and System 2 monitors the quality of these proposals, which it may endorse, correct or override. The judgments that are eventually expressed are called intuitive if they retain the hypothesized initial proposal without much modification.

How System 1 and System 2 Connect to Lucid Dreaming

System 1 thinking is involved in lucid dreaming through the unconscious, or, the dream content which is generated without any conscious awareness of the dreamer. When people lucid dream they are typically in a state of REM sleep (Erlacher, 2005) and can therefore interact directly with this unconscious mind. Natural creativity and insight can then be brought to light through this conscious interaction and subsequent recall.

System 2 helps problem solving in lucid dreams through planning, goal execution, and solution selection. People utilize System 2 in order to decide which problem to focus on in their lucid dream, which way to solve that problem (i.e. interview a dream character, speak directly to the dream etc.), and in order to decide which solution that their dream offers them is the most appropriate for their situation.

<div align="center">METHODS OF PROBLEM-SOLVING IN LUCID DREAMS</div>

There are several different ways people solve problems in lucid dreams. Some people use lucid dreams in order to change "a bad dream or nightmare into a pleasant one (Schädlich & Erlacher, 2012, p. 134-138)," some use them in order "to solve a particular problem, such as work-related or academic problems or conflicts

with others (Schädlich & Erlacher, 2012, p. 134-138)," while others use them "to come up with new creative ideas or insights, such as drawings, paintings, texts, music pieces (Schädlich & Erlacher, 2012, p. 134-138)." One way in which many of these types of problems are solved is through the use of dream characters. A couple of studies have been conducted in order to test the efficiency of this method. In 1989 Tholey conducted a study in which he addressed what kind of consciousness and cognitive abilities dream characters possess; whether or not they have their own access to memory; and whether or not they are capable of creative thought. In his study, nine experienced lucid dreamers were instructed to set certain tasks for dream characters to accomplish in lucid dreams: (1) to draw or write something; (2) to name a word unknown to the dreamer; (3) to find rhyming words; (4) to do arithmetic (Stumbrys, Erlacher, & Schmidt, 2011, p. 35-40).

Some dream characters were able to write and draw; to rhyme; and even to say an unknown word to the dreamer. However, somehow the dream characters struggled with arithmetic. It was discovered that dream characters were usually unable to solve the arithmetical problem when the answer exceeded 20. In a few cases when they were able to do that (e.g. five times five or six times six), the dreamer knew the correct result before the dream character answered (Stumbrys, Erlacher, & Schmidt, 2011, p. 35-40).

Tholey (1989) also found that "dream characters show themselves to be especially ingenious when it is a question of outwitting the dream ego." Some dream characters seem to have an access to both waking memory and previous dreams and, interestingly enough, when a dream character is asked whether it has its own

consciousness, it could answer: "I am sure that I have a consciousness, but I doubt if you have one, because you ask me such stupid questions!" Based on his findings, Tholey concludes that, despite poor performance on arithmitic, at least some dream characters are capable of remarkable cognitive achievements in other areas, and suggests that dream characters should be "taken seriously as if they had consciousness of their own (Stumbrys, Erlacher, & Schmidt, 2011, p. 35-40)."

In Stumbrys and Daniels' (2010) study on creative problem solving in lucid dreams, nine lucid dreamers (the experimental group) and nine non-lucid dreamers (the control group), for ten consecutive nights, had either to solve a logical puzzle or to create a metaphor.

Some evidence was found that lucid dreams may contribute to problem-solving when dealing with more creative rather than logical tasks. Dream characters, and especially the ones who acknowledged themselves as 'guides', can also provide credible advice relating to more creative tasks. This suggested difference between more creative and more logical taks to some extent resemebles Tholey's (1989) findings: in his study dream characters were more successful with creative taks but struggled when doing arithmetic which required rather logical thinking (Stumbrys & Daniels, 2010, p. 121-129).

As Robert Waggoner says:

Dream figures exist in much greater complexity and variety than most dream theorists imagine. When lucid dreamers consciously engage and converse with dream figures, the dream figures frequently surprise them with their knowledge, observations, and rational comments (as we saw in the examples

in chapter 5). As such, lucid dreaming provides for an entirely new perspective on the nature of the dream realm and dream figures.

Some dream figures appear to be simple thought-forms or symbols, representing some idea, expectation, or emotion in the lucid dream; this group has little or nothing to say. Other dream figures, as previously discussed, argue logically and convincingly for their autonomous existence in an environment they perceive as real and resent the lucid dreamer's comments about "creating" them. Still other lucid dream figures go beyond this and actually act in such a way as to be seen as independent agents with an apparent agenda of their own, sometimes in contradiction to that of the lucid dreamer. As we shall see, on rare occasions dream figures will appear and spontaneously announce they are guardians or helpers, there to assist or watch over the lucid dreamer; they sometimes even provide useful advice or suggest ways to manipulate the lucid dream environment.

Dream figures don't appear to possess the same broad abilities of the inner awareness behind the dream; those abilities seem to be specific to the inner awareness alone. Instead, the variety of dream figures manifest as points of increasing complexity and functionality along a broad continuum of awareness, knowledge, and ability to change the dream environment. By contrast, the inner awareness, when consulted by the lucid dreamer, responds with a much deeper sense of awareness, insight, and knowledge plus the ability to create an entirely new dream environment that expresses

concepts and abstract ideas in direct response to the lucid dreamer's request (Waggoner, 2012, p. 125-126).

Problem-solving in lucid dreams can also be achieved by turning to the advice of the dream itself. As Robert Waggoner says,

The first guideline in "asking the dream" involves the importance of properly wording the request. The words selected convey the intent of the request and strongly affect the forthcoming response, so exact wording is crucial. A fascinating example of this comes from poet and painter Epic Dewfall, who has used lucid dreaming as a means to discover new artwork to create. As he prepares to visit his own "inner art gallery," wording is key to what the dream reveals to him.

"I get ideas for my paintings from lucid dreams," he says. "About once a month when I'm dreaming, I will realize I'm dreaming, and when I do, I then walk around in the dream looking at art on the walls. I usually find many paintings on every wall. By the time one of these lucid dreams ends, I usually have one or two good paintings memorized . . . I've been doing this as a hobby since 1986." When he stops to look at a particularly interesting piece, he says, "I'll wake up after I have been looking at it for about six seconds; I suspect this is because I've stopped moving from painting to painting." As lucid dreamers know staring at an object for an extended period of time will normally collapse the dream.

Now here's the important lesson: Experience has taught Dewfall to phrase his lucid dream incubation such that he will look "at art" and not "for

art." (Dream incubation refers to the practice of intending to dream about a particular topic by concentrating on it before sleep.) When he suggested to become lucid and to look "for art," he found himself doing just that— literally looking for art— trying to find art somewhere in his lucid dream! Thus his whole lucid dream would become a futile search "for art." This misdirected wording taught him to incubate a lucid dream in which he would become aware and look "at art." He then found himself lucidly aware in a room with works of art all over the wall. The conscious unconscious responded to the exact wording of the request. By all appearances, the dreaming awareness took into consideration the precise meaning of the preposition, at versus for, and weighed the intent of the wording in its response.

In addition, when lucid and we "ask the dream," the response arrives in direct relation to the form of our request. If we ask the dream "to see," then a visual display appears. If we ask "to hear," then an auditory event occurs, just as in my "Hey! I want to hear my feelingtone!" experience. Again, the wording of the request appears to be crucial in the materialization of the response. A poorly worded request and its fuzzy intent can alter the resulting experience away from the waking goal of the lucid dreamer. As a lucid dream figure once told me as I sought the principles of flying, "In the form is the outcome (Waggoner, 2012, p. 140-141).

Another example of this "inner awareness" helping with creativity can be seen in one of Charlie Morley's (a Tibetan buddhist monk and avid lucid dreamer)

lucid dreams which he chronicles in his most recent book: *Dreams of Awakening: Lucid Dreaming and Mindfulness of Dream & Sleep*.

Before bed I had been thinking about what I wanted to talk about at my upcoming 'Secret Garden Party' slot. I had thought that the concept of Oneness and how it related to lucid dreaming seemed like a good subject, but it was too late to work on it, so I went to bed.

I then spent the entire night dreaming about the concept of Oneness and actually ended up writing a talk about it within a lucid dream! I had five different dreams in fact, but all were about writing and performing a new talk on Oneness. I wrote almost the entire talk in the dreams, rehearsed it and even showed it to dream characters who gave me feedback and advice. The first dream, which was lucid '(aware)'/witnessing '(experienced from a third person perspective),' even gave me an original title: 'Oneness: from Theory to Practice', and told me that it should be about ten minutes long and must start with the line 'I wrote this talk in a dream' and finish with the question 'If everything is Oneness, why bother?' (Morley, 2013, 256-257).

In this example the dream not only gave Charlie fully-formed quotes to use at the beginning and end of his speech, but also gave him an idea of how long his speech should be. This variety of advice on a topic as complex as an upcoming lecture demonstrates that the awareness behind the dream is capable of helping with more than just trivial emotional concerns of the dreamer.

One reason Robert Waggoner assumes that it is possible to get such helpful information from the unconscious is because he believes it is "conscious and alive"

rather than "chaotic, primitive, and archaic (Waggnoner, 2012, p. 53-54)." In his book Lucid Dreaming: Gateway to the Inner Self, Waggoner explains that

> One finds much more in dreams than reflections of the conscious mind and conscious memories. In dreaming, one touches the unconscious, something that extends beyond the waking self. As Jung observed, "Looked at in this way, the unconscious appears as a field of experience of unlimited extent. If it were merely reactive to the conscious mind, we might aptly call it a psychic mirror world. In that case, the real source of all contents and activities would lie in the conscious mind, and there would be absolutely nothing in the unconscious except the distorted reflections of conscious contents. . . . The empirical facts give the lie to this."

> At this point, my lucid dream experiences were bringing me to this same realization— the unconscious does not merely reflect a "psychic mirror world" of the conscious mind. Whenever I experienced the unexpected while lucid dreaming, I experienced something beyond the mirror, beyond the conscious mind. The information was not from my waking self; rather, it came from the unconscious, "a field of experience of unlimited extent."

> Jung continued, "Because the unconscious is not just a reactive mirror reflection, but an independent, productive activity, its realm of experience is a self-contained world, having its own reality, of which we can only say that it affects us as we affect it— precisely what we say about our experience of the outer world."

Suddenly, I could see that when lucid dreamers ask the dream a question or ask the dream to do something (e.g., "I want to see more attractive women in here when I open this door again!"), the unconscious independently listens and responds. Aware in a lucid dream, one has access to this inner reality of the unconscious and its creativity. But because we lucid dreamers tend to focus simply on our own actions and manipulations in the dream state, and because we assume we create the dream, we never bother to ask the dream itself. To get beyond ourselves, we have to stop focusing on our doings and manipulations and allow the unconscious an opportunity to respond.

Now, within just a few lucid dreaming experiments, I could see a dramatic conclusion developing: *The unconscious was not chaotic, primitive, and archaic. The unconscious appeared to be both conscious and alive* (Waggoner, 2012, p. 53-54)*.*

<div align="center">CONCLUSION</div>

Due to the diversity of thinking styles that go into it, along with the fact that it occurs during the association-rich state of REM sleep, lucid dreaming seems to have the potential to serve as an effective problem-solving method. Those wishing to utilize it as a method can use dream characters or the dream itself in order to communicate directly with the 'conscious' unconscious (System 1) and can plan out which problem they would like to solve as well as which solution they would like to choose through the use of System 2 thinking. Using both systems concurrently is what allows for the cultivation of expertise/wisdom. In fact, its been said that

"knowledge is informed by both logic and concrete experience (Dansereau, Knight, & Flynn, 2013, p. 274-282)," which implies that both System 1 and System 2 are necessary in order for this acquisition of knowledge to occur.

As stated before, System 1 is inherent in the process of problem-solving through lucid dreaming, and includes the unconscious itself as well as prior memories, past experience, and information related to the problem at hand. System 2 is an additional thinking style added on to the problem solving process in order to plan which problem one would like to solve, how to go about solving that problem, and how to go about choosing a solution from the many different options that the unconscious is likely to offer. For future research I recommend looking into finding a stricter methodology for solving problems in lucid dreams (possibly involving System 1 and System 2) and finding out which types of problems are most easily solved (i.e. personal problems or objective problems). Finding the answer to both of these issues would be enormously helpful not only for the field of lucid dreaming but also for the fields of problem solving, cognition, and creativity.

REFERENCES

Agnoli, F. (1991). Development of judgmental heuristics and logical reasoning: training counteracts the representativeness heuristic. *Cognitive Development*, 6, 195-217.

Agnoli, F. and Krantz, D.H. (1989). Suppressing natural heuristics by formal instruction: the case of the conjunction fallacy. *Cognitive Psychology*, 21, 515-550.

Amabile, T. M. (1996). *Creativity in context*. Boulder, CO: Westview Press.

Barrett, D. (2001). *The committee of sleep: How artists, scientists, and athletes use dreams for creative problem-solving—and how you can too.* New York: Crown.

Bless, H., Clore, G.L., Schwarz, N., Golisano, V., Rabe, C, & Wolk, M. (1996). Mood and the use of scripts: Does a happy mood really lead to mindlessness? *Journal of Personality and Social Psychology*, 71(4), 665-679.

Brunswik, E. (1943). Organismic achievement and environmental probability. *Psychological Review*, 50, 255-272.

Cai, D. J., Mednick, S. A., Harrison, E. M., Kanady, J. C., & Mednick, S. C. (2009). REM, not incubation, improves creativity by priming associative networks. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 106*(25), 10130-10134.

Chaiken, S. and Trope, Y. (1999). Dual-Process Theories in Social Psychology. *Guilford Press*. New York.

Dansereau, D. F., Knight, D. K., & Flynn, P. M. (2013). Improving adolescent judgment and decision making. *Professional Psychology: Research and Practice, 44*(4), 274-282.

Dewhurst, S. A., Thorley, C., Hammond, E. R., & Ormerod, T. C. (2011). Convergent, but not divergent, thinking predicts suscepti- bility to associative memory illusions. *Personality and Individual Differences*, *51*, 73–76.

Erlacher, D. (2005). Motorisches Lernen im luziden Traum: Phä- nomenologische und experimentelle Betrachtungen. University of Heidelberg: URL: http://www.ub.uni-heidelberg.de/archiv/5896.

Erlacher, D. (2009). Recall of a specific word list in lucid dreams: an explorative online study. *International Journal of Dream Research, 2,* 37–40.

Erlacher, D., & Schredl, M. (2008). Do REM (lucid) dreamed and executed actions share the same neural substrate? *International Journal of Dream Research, 1*(1), 7-14.

Erlacher, D., & Schredl, M. (2010). Practicing a motor task in a lucid dream enhances subsequent performance: A pilot study. *The Sport Psychologist, 24*(2), 157-167.

Finucane, M.L., Alhakami, A., Slovic, P., & Johnson, S.M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, 13, 1-17.

Gilbert, D. (1999). What the mind's not. In Chaiken, S. and Trope, Y. (1999). Dual-Process Theories in Social Psychology. *Guilford Press*. New York. pp. 3-11.

Guilford, J. P. (1967). *The nature of human intelligence*. New York, NY: McGraw-Hill.

Guilford, J. P., & Hoepfner, R. (1971). *The analysis of intelligence*. New York, NY: McGraw-Hill.

Hammond, K.R. 1996. Human Judgment and Social Policy. New York: Oxford University Press.

Hasselmo, M. E. (1999). Neuromodulation: Acetylcholine and memory consolidation. *Trends in Cognitive Sciences, 3*(9), 351-359.

Hearne, K. M. (1978). Lucid dreams: an electrophysiological and psychological study. University of Liverpool, Liverpool.

Isen, A.M., Nygren, T.E., & Ashby, F.G. (1988). Influence of positive affect on the subjective utility of gains and losses – it is just not worth the risk. *Journal of Personality and Social Psychology*, 55(5), 710-717.

Kahneman, D. and Frederick, S. 2002. Representativeness revisited: Attribute substitution in intuitive judgment. pp. 49-81 in T. Gilovich, D. Griffin, and D. Kahneman [eds]. Heuristics & Biases: The Psychology of Intuitive Judgment. New York. Cambridge University Press.

Kahneman, D., Slovic, P., & Tversky, A.E. (1982). Judgment under uncertainty: Heuristics and biases. Cambridge University Press.

Leung, A. K., et al. (2012). Embodied metaphors and creative "acts". *Psychological Science, 23*(5), 502-509.

LaBerge, S. (1980). Lucid dreaming: An exploratory study of consciousness during sleep. Stanford University, Palo Alto, CA.

LaBerge, S. (1985). *Lucid dreaming. The power of being awake and aware in your dreams.* Los Angeles: Tarcher.

Morley, C. (2013). Dreams of Awakening: Lucid Dreaming and Mindfulness of Dream & Sleep. Hay House UK, 256-257.

Nemeth, C. J. (1986). Differential contributions of majority and minority influence. *Psychological Review*, *93*, 23–32.

Nisbett, R.E., Krantz, D.H., Jepson, C., and Kunda, Z. 1983. The use of statistical heuristics in everyday inductive reasoning. Psychological Review. 90(4) 339-363.

Redfering, D. L., & Keller, J. N. (1974). Influence of differential instruction on the frequency of dream recall. *Journal of Clinical Psychology, 30,* 268-271.

Schädlich, M., & Erlacher, D. (2012). Applications of lucid dreams: An online study. *International Journal of Dream Research, 5*(2), 134-138.

Schredl, M., & Erlacher, D. (2004). Lucid dreaming frequency and personality. *Personality and Individual Differences, 37,* 1463–1473.

Schredl, M., & Erlacher, D. (2007). Self-reported effects of dreams on waking-life creativity: An empirical study. *Journal of Psychology: Interdisciplinary and Applied, 141*(1), 35-46.

Simonton, D. K. (2003). Scientific creativity as constrained stochas-tic behavior: The integration of product, person, and process per-spectives. *Psychological Bulletin*, *129*, 475–494.

Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin*, 119, 3-22.

Stanovich, K. E. and West, R. Individual differences in reasoning: Implications for the rationality debate. (Chapter 24, this volume).

Stickgold R., et al. (1999). Sleep-induced changes in associative memory. *Journal of Cognitive Neuroscience*, 11, 182-193.

Stumbrys, T., & Daniels, M. (2010). An exploratory study of creative problem solving in lucid dreams: Preliminary findings and methodological considerations. *International Journal of Dream Research, 3*(2), 121-129.

Stumbrys, T., Erlacher, D., & Schmidt, S. (2011). Lucid dream mathematics: An explorative online study of arithmetic abilities of dream characters. *International Journal of Dream Research, 4*(1), 35-40.

Strunz, E. (1993). Preconscious mental activity and scientific problem-solving: A critique of the Kerkule dream controversy. *Dreaming, 3,* 281-294.

Tholey, P. (1989). Consciousness and abilities of dream characters observed during lucid dreaming. *Perceptual and Motor Skills*, 68(2), 567-578.

Tholey, P. (1981). Empirische Untersuchungen über Klarträume [Empirical study on lucid dreams]. *Gestalt Theory, 3,* 21–62.

Tversky, A. & Kahneman, D. (1974). Judgement under uncertainty: Heuristics and biases. *Science*, 185 (4157), 1124-1131.

Van de Castle, R. L. (1994). *Our dreaming mind.* New York: Ballentine.

Waggoner, R. (2012). Lucid dreaming: gateway to the inner self. Red Wheel/Weiser, Kindle Edition, 53-54, 115-116, 125-126, 140-141.

Walker, M.P., et al. (2002). Practice with sleep makes perfect: Sleep-dependent motor skill learning. *Neuron*, 35, 205-211.

Yaniv, I., & Meyer, D. E. (1987). Activation and metacognition of inaccessible stored information: Potential bases for incubation effects in problem solving. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 13*(2), 187-205.