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## The Effects of Suggestion on Dream Recall Frequency

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THE EFFECTS OF SUGGESTION ON DREAM RECALL FREQUENCY

by

Jack Obery

A Thesis Submitted in Partial Fulfillment  
of the Requirements for a Degree with Honors  
(Psychology)

The Honors College

University of Maine

May 2012

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## ABSTRACT

The present research was designed to examine whether the power of suggestion can play a substantial role in a participant's dream recall frequency (DRF; i.e., the average number of dreams remembered nightly). Nineteen students participated in a lab session in exchange for course credit, during which they completed a task assessing working memory capacity and several questionnaires. Of the 19 students, five chose to participate in the second phase of the study, for which they received \$10. These five participants were randomly assigned to a "high dream capacity" group (i.e., told they have the highest dream capacity of anyone studied thus far) or an "average dream capacity" group (control) during the lab session. Participants recorded their DRF and other sleep-related measures for seven consecutive nights following the initial lab session. Although there was no significant difference between the DRF of participants in the high capacity group and the DRF of those in the average capacity group, a pattern consistent with the hypothesis was found. That is, those given the suggestion of a higher dream capacity experienced a higher DRF in the week following the initial lab session than those given the suggestion of an average dream capacity.

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## INTRODUCTION

### Dream Recall Frequency (DRF)

A dream is “a series of thoughts, images, or emotions occurring during sleep,” (Merriam-Webster Online). Although most people are familiar with the concept of dreams, the phenomenon has gone largely unexplained throughout human existence, and mechanisms underpinning the creation of dreams in the brain are mostly unknown (De Gennaro, Marzano, Cipolli, & Ferrara, 2011). It was long considered that dreams occur only in a stage of sleep called “rapid eye movement” (REM), which was discovered by Eugene Aserinsky and Nathaniel Kleitman in the early 1950’s (Aserinsky & Kleitman, 1953). Dreams and REM-stage sleep were believed to be mutually inclusive, in that one did not occur without the other (Palagini, Gemignani, Feinberg, Guazzelli, & Campbell, 2004). Supporting this claim, REM eye movement density (EMD) matches a dream’s visual imagery, and rapidly moving eyes seemed to be “scanning” an imaginary environment (Palagini et. al., 2004).

Despite those long-held beliefs, dreams have been shown to occur in both REM and NREM (non-rapid eye movement) sleep cycles. For example, personal reports of dream-like mental activity (whether it be actual dreams or simply “sleep thoughts”) have been documented during every stage of nocturnal sleep (Palagini et. al., 2004). However, brain wave frequencies and active brain regions differ between different sleep stages, and also between separate cycles of the same stage; this variance in brain activity has been thought to play a substantial role in whether or not dreams are recalled in any stage (Chellappa, Frey, Knoblauch, & Cajochen, 2011). Dreams that occur in REM-stage sleep differ qualitatively from those occurring in NREM sleep in terms of their length,

vividness, and bizarreness, among other varying traits (De Gennaro et. al., 2011). Although dreams can occur during non-REM sleep, most of the dreams that were recalled happen in REM sleep (Cory, Ormiston, Simmel, & Dainoff, 1975). A few specific regions of the brain (the temporo-parieto-occipital junction and the ventromesial prefrontal cortex) have been shown to mediate dream recall in neuroimaging studies with brain lesion patients (De Gennaro, et. al., 2011). Additionally, surface EEG studies indicate that sleep cortical oscillations that result in the successful recall of a dream are the same ones shown when encoding and recalling waking memories (De Gennaro, et. al., 2011).

Every person dreams every night (Aserinsky & Kleitman, 1953). There are, however, substantial individual differences in how well people remember their dream content, or whether they remember dreaming at all. Much of dream research, thus, focuses on dream *recall* rather than specific themes and details. One line of research demonstrated gender differences in dream recall. That is, women have a higher dream recall frequency (DRF) than men, and report their dreams having a greater impact on the succeeding day (Brand et. al., 2011). Given, however, that the gender differences in DRF were no longer significant once engagement in dreams (i.e., how absorbed and interested one is in their dreams) was accounted for, Shredl (2010) attributed gender differences in DRF to a similar difference of *engagement* in dreams between genders. However, the relationship between engagement and frequency may be circular, with one reinforcing the other. That is, interest in dreams could lead to more dreams being remembered, and a higher DRF, in turn, might spark a heightened interest in dreams.

DRF seems to be related to the amount of nocturnal awakenings a person has nightly (Schredl, 2010). Therefore, some women's heightened DRF could be related to a tendency to wake up more often during the night. People with insomnia seemed to exhibit a similar effect. Indeed, the gender differences in DRF are much smaller in children whose sleep quality is generally good. Similarly, the higher DRF reported by some insomniacs is attributable to their more frequent nocturnal awakenings (Schredl, 2010). A longitudinal study observing the changes in DRF and interest in dreams over time could clarify whether sleep quality plays a causal role in DRF.

Socialization could be at least partially responsible for the significant gender difference in DRF. For example, higher levels of expressivity, a trait commonly associated with being female, were correlated to a higher DRF (Schredl & Lahl, 2010). Additionally, individuals who were more feminine, regardless of gender, reported higher DRF (Schredl & Lahl, 2010). Biological sex, however, was still a stronger indicator than the trait alone. Sharing dreams with family and friends and an interest in dream interpretation were also more common in women, which could explain the higher DRF of women. Conversely, they might be byproducts of higher DRF (Schredl & Lahl, 2010).

A study addressing political ideology and dream recall found that self-described liberals had a significantly higher DRF than conservatives (Bulkeley, 2011). The same pattern of results was found when DRF was examined separately for men and women. That is, male liberals experienced more frequent dream recall than male conservatives, as did female liberals compared to female conservatives. Previous studies (Bulkeley, 2006) have found that liberals tend to have a slightly worse quality of sleep and are more "expansive" dreamers than conservatives. These results are, thus, in line with other

studies (e.g., Schredl, 2010) demonstrating the association between poor sleep quality and higher DRF. Although the results do not indicate causality, they suggest that cultural background might be differentially associated with DRF.

Although there have been clinical anecdotes reporting that Selective Serotonin Reuptake Inhibitors (SSRI's) have intensified dreaming in some users, Pace-Schott and colleagues (2001) found otherwise. In this study, they obtained REM-sleep related measures with the Nightcap ambulatory sleep monitor (Ajilore, Stickgold, Rittenhouse, & Hobson, 1995), a two-channel recording device that distinguishes the waking state, REM sleep, and non-REM sleep. They obtained estimates of REM latency and eyelid movement density during REM sleep throughout a 31-day trial period while the participants also filled out dream logs and emotion reports. The first 7 days served as a drug-free baseline period. During the next 19-day treatment period, participants were given either 100 mg fluvoxamine or 20 mg paroxetine (divided daily into morning and evening doses). Finally, the last 5 days were an acute discontinuation period. The tendency to enter REM sleep decreased during the treatment period, and dream frequency and intensity were lower during the treatment than the other two phases. Participants also showed an increase in length and bizarreness of dreams during the discontinuation phase. The lower frequency and intensity of dreams during the treatment period could be a result of serotonergic properties that suppress REM-type sleep, while the increased length and bizarreness of reported dreams during the discontinuation phase may be caused by cholinergic rebound from serotonin suppression (Pace-Schott et. al., 2001). In a related study (Rundell, Lester, Griffiths, & William, 1972), higher consumption of alcohol correlated with fewer dreams with suppressed intensity. The study included a repeated

dose condition, in which EEG sleep patterns were affected by the direct action of alcohol on the brain. The REM stage of sleep during which most remembered dreams occur had a marked decrease of eye movements (Rundell et. al., 1972).

The biggest obstacle to what could be considered “perfect” dream recall ability (a recall in which there is no disconnect between what is remembered vs. what was actually dreamed) is the dissociation between the waking and dreaming states (Beaulieu-Prevost & Zadra, 2005). The recall, recording, and sharing of dream information happens completely independently of the state in which dreams occur, and the fact that dreams are so easily forgotten inhibits much of our ability to accurately remember and interpret them. Most importantly, certain social and cognitive processes come between our actual experience of the dream and the instant we remember it (Beaulieu-Prevost & Zadra, 2005), during the few waking moments between the dream and the time when most skilled dreamers record their memories. It would, thus, be reasonable to expect that individual characteristics would play a substantial role in a person’s DRF, especially since rates of dream recall are so varied among most people.

Certain personality factors, such as hypnotic susceptibility, absorption, and thin boundaries have been significantly correlated to the frequent recall of dreams (Hartmann, 1989; Spanos, Stam, Radtke, & Nightingale, 1980). One study (Brand et. al. 2011), found that higher DRF is associated with positive mood, creativity, health and well-being. Other personality factors including neuroticism, trait anxiety, and extroversion have all been associated negatively with DRF (Schredl & Montasser, 1996; 1997). All associations between personality factors and dream recall were stronger when the subjects’ attitudes towards dreams were factored in (Schredl, Ciric, Götz, & Wittmann, 2003).

Despite these findings, the strength of the association between personality factors and DRF is questionable. For example, Levin, Fireman, and Rackley (2003) demonstrated that none of the potentially dream-related personality traits measured (imaginative involvement, absorption, and fantasy-proneness) were statistically reliable predictors of DRF. Blagrove and Akehurst (2000) obtained similar results when testing the relationship between DRF and traits such as type A/B personality and locus of control.

### Suggestion

The power of suggestion, the influence that a certain belief can have on a respective thought, action, or stimuli, has been proven effective in therapeutic settings (Wilson, 2011). Even studies in which a treatment group was given an actual drug and a control group was given a placebo believed to be a drug, suggestion (i.e., placebo) exhibited an effect equivalent to or greater than an active drug (Wilson, 2011). Results of a controversial meta-analysis (Kirsch and Sapirstein, 1998) suggest that 50% of the effects of anti-depressant medications can be attributable to placebo effects.

Much of the research concerning the influence of suggestion and placebo administration is related to pain, often with results indicating that suggestion of tolerance or a weaker pain sensation will yield the suggested effects. For example, when participants rehearsed a suggested message (i.e., messages about the beneficial effects of ice-water hand immersion or messages about the negative effects of exposure to ice water) and focused on it, the suggestion made a significant difference in pain tolerance and threshold (Staats, Hekmat, & Staats, 1998). That is, participants who received positive affirmation experienced a spike in tolerance *and* threshold, whereas participants

who received negative affirmation exhibited a decrease in both pain tolerance and threshold. In contrast, the control group who did not receive any suggestive message exhibited minimal differences between pre- and post-tests (Staats et. al., 1998).

Similarly, pain tolerance was significantly higher in a group of participants who received nondirective suggestions about pain (an overview of pain theory in which suggestions for dealing with pain were placed) before being assessed for pain threshold and tolerance using a pressure algometer, compared to a control group who received no suggestion (Neumann, Kugler, Seelbach, & Krüskemper, 1997). Likewise, when the effects of direct suggestion on pain threshold and tolerance were examined during both waking and hypnotic states, suggestion of analgesia was much more effective in reducing pain than mere suggestion of relaxation (Statcher, 1975).

In one study (Put et. al., 2004), asthma patients were given three different inhalers, all loaded with inert substances. However, participants were told one contained air, another contained a bronchoconstrictor, and the third one contained a bronchodilator. Throughout the study, general respiratory obstruction tended to follow what participants believed to be taking, but the only significant decrease in symptoms came after the asthmatics took what they believed to be a bronchodilator.

The effects of suggestion, however, may depend on an individual's hypnotic susceptibility level. For example, when participants were given the suggestion that their arms were numb and insensitive, there was a marked decrease in pain among participants high in hypnotic susceptibility. Participants whose hypnotic susceptibility level was low did not demonstrate any effects due to suggestion (Spanos, McNeil, Gwynn, & Stam, 1948). In another study assessing the effects of suggestion and hypnotic susceptibility on

pain sensation, participants were assigned to one of the four conditions: analgesia suggestion alone; verbal-distraction task alone; a combination of the first two conditions; and a control (Farthing, Venturino, & Brown, 1984). The three experimental treatments were all effective in reducing sensations of pain among the “hypnotizable” participants, but only the distraction was effective in reducing pain among non-hypnotizables. Individuals high on hypnotic susceptibility, thus, are more affected by the suggestion given to them.

In relation to sleep, LeShan (1942) examined the effects of a suggestion during sleep on the cessation of nail-biting in a group of 8-12 year-old boys. In this study, a portable phonograph was set to play a record containing 50 repetitions of “My fingernails taste terribly bitter” six times per night once the boys had all fallen asleep (tested by being asked “Is anyone awake?” by a counselor about a half hour after lights out) for 54 consecutive nights during a summer camp. At the end of the study, 8 out of 20 boys in the experimental group had stopped biting their nails, but *no one* in the control group had stopped biting. Suggestion during sleep, thus, can have a considerable effect on participants.

A number of studies have tested the effects of a suggestion on sleep patterns and dreams. The use of hypnosis has been shown to be useful in some cases of instilling suggestion but not necessary when instilling suggestion of dreams. The most effective suggestions were authoritatively worded when dealing with hypnotized patients (e.g. “You *will* dream about...”), and permissively worded when suggested in a normal waking state (“*Try* to dream about...”) (Barber, Walker, & Hahn, 1973).

Most studies on dreams and the influence of suggestion focused on manipulating the *content* of dreams. For example, Burnett (2008) attempted to control the positive and negative affectivity of dreams in participants who had a marked fear of snakes. Over four non-consecutive nights (one adaptation night, one baseline night of dream collection during REM sleep, and two nights of REM dream collection with pre-sleep suggestions), participants were monitored for dream activity and content. On the last two nights, participants were given one of four suggestions. The first group was suggested to have a positive dream about snakes; group two was suggested to have a positive dream about a neutral animal; group three was suggested to have a negative dream about a neutral animal; and group four was suggested to have a negative dream about snakes. Participants were also shown a live snake before and after nights two, three, and four; however, they did not have to touch the snake. Suggestion was shown to increase both positive *and* negative affect in dreams when given, relative to a participants' group (i.e., those told to have a positive dream about snakes experienced more positive dreams, and those told to have a negative dream about snakes experienced more negative ones). However, the animal content of dreams was not significantly affected.

Another study (Nikles II, Brecht, Klinger, & Bursell, 1997) asked students to spend four nights in a lab using a design similar to the previous study (Burnett, 2008), with one adaptation night, one baseline night, and two suggestion nights where REM-sleep dreams were recorded. On suggestion nights, a pre-sleep suggestion was given about a current concern on one night, and suggestion unrelated to concern was given the next night (the order of the kind of suggestions was counterbalanced). Suggestion about current concerns influenced dream content significantly more than suggestion of a

concern-unrelated topic. Additionally, concern-unrelated suggestion did not significantly influence dream content at all, as the researchers had predicted (Nikles II et. al., 1997).

Unlike most studies that focused on the effects of suggestion on the content of a dream, Halliday (1992) examined the effect of suggestion on DRF. In this study, 45 participants who had not reported a single recalled dream in the past month were either strongly encouraged to recall their dreams or simply questioned about recalling their dreams. At the end of the study, 32% of the questioned group exhibited an increase in DRF, whereas 68% of the strongly encouraged group exhibited an increase in DRF. These results indicated that a mere *suggestion* of being able to remember dreams could increase an individual's DRF, which could potentially translate to an increased recall in dream detail.

#### Anxiety & Depression

The relationship between sleep and anxiety has been well documented, and sleep disorders are often comorbid with anxiety issues (Chase & Picus, 2011). Ninety percent of children and adolescents (aged 6 to 18) with anxiety disorders (diagnosed with either generalized anxiety disorder, social phobia, obsessive-compulsive disorder, or separation anxiety) had at least one sleep-related problem, while 82% had two or more (Chase & Picus, 2011). Furthermore, the number of anxiety disorders a child is diagnosed with could indicate the number of sleep disorders they suffer from.

In a study comparing adolescents with anxiety disorders to a healthy control group, a significant relationship was found between anxiety and less overall sleep time, less sleep period time, and the amount of time spent nightly in REM stage sleep (Rosa, Bonnet, & Kramer, 1983). A recent study replicated these findings by demonstrating

relations between anxiety, depression, and sleep disturbance, which are partly due to genetics (Gregory et. al., 2011).

Conversely, one study found that intentional deprivation of certain stages of sleep could *reverse* depressive symptoms. Landsness, Goldstein, Peterson, Tononi, and Benca (2011) considered “abnormalities in slow wave sleep” as one of the most consistent biological markers of depressive symptoms. As such, they examined whether the selective inhibition of slow wave sleep could curb symptoms in participants with major depression. Individuals with major depression were subjected to baseline, slow wave deprivation (SWD), and recovery sleep sessions. During the SWD sessions, acoustic stimuli were used to prevent the occurrence of slow wave sleep without waking participants. Both the self-rated and researcher-administrated measures indicated a significant decrease in depressive symptoms during the time that slow wave activity (SWA) was inhibited (Landsness et. al., 2011).

Nevertheless, a lack of sleep, especially insomnia, can be the primary catalyst in the onset and development of depression (Edge, 2010). According to a recent meta-analysis (Edge, 2010), sleep quality in those with major depressive disorder is characterized by interruptions in sleep continuity and a decrease in slow wave sleep, which contradict Landsness et. al.’s (2010) findings. In addition, major depressive disorder is associated with a shortening of REM latency (the amount of time between falling asleep and the onset of REM-stage sleep), and, more interestingly, *longer* periods of REM sleep. Given the previous findings that most recalled dreams occur during REM sleep (Cory et. al., 1975) and that poor sleep quality is related to a higher DRF (Schredl, 2010), depression might be associated with higher DRF.

Relations between anxiety and depression and DRF, however, are equivocal. An early case study (Alcaraz, 1970) found that a moderate anxiety level could increase phase 1 REM sleep time, whereas an excessive amount of anxiety can extinguish it. A study by Rosa, Bonnet, and Kramer (1983) found that even though anxious subjects slept lighter and for less time than normal subjects, there was not a significant relationship between anxiety and latency to REM (Rosa, et. al., 1983).

To examine the relation between anxiety and DRF, the frequency of students' dream activity and dream recall were assessed over two separate weeks (Duke & Davidson, 2002). More specifically, DRF was examined during the week prior to mid-term examinations, when most students have higher stress and anxiety levels than normal, and a neutral study week at another time during the semester. As expected, students reported higher stress levels during the pre-examination week. More importantly, there was an overall increase in the number of nights dreams were remembered during the stressful week (Duke & Davidson, 2002), suggesting anxiety might be associated with greater DRF. However, as reviewed earlier, other studies found that anxiety and/or personality traits highly related to anxiety and depression (e.g., neuroticism) are negatively associated with DRF (Schredl & Montasser, 1996; 1997).

The present study seeks to determine whether the power of suggestion of a superior capacity for dream recall frequency (DRF) can influence a subject's actual DRF. In addition, given the previous inconsistent finding, the study also examined the relation between the levels of anxiety or depressive symptoms and DRF in college students.

## HYPOTHESIS

The hypotheses of the current research are as follows:

- Participants who are given the suggestion that they dream more frequently and with greater intensity than anyone else participating in the study (i.e., high capacity group) will report a significantly higher DRF during the week following their initial lab session than the normal capacity group.
- DRF will be positively associated with participants' levels of anxiety and depression.

## METHOD

### Participants

Students from Introductory Psychology classes were recruited for this study in exchange for course credit. All students were 18 years of age or older, but there were no gender restrictions or other limitations to potential participants.

### Task

Participants completed the Reading Span task (RSPAN), which consists of an alternating series of sentences and letters in succession (Daneman & Carpenter, 1980). After reading each sentence, participants were asked to indicate whether it was meaningful (and thus grammatically correct) or nonsensical by clicking either a “yes” or “no” box on the screen with the mouse. Between sentences, a single letter appeared on a screen for a few seconds. The possible letters were F, H, J, K, L, N, P, Q, R, S, T, or Y, and participants were asked to remember the order in which these letters were presented. The length of the series of letters ranged between 3 and 9, with sentences between each. After each series, a screen appeared with a clickable box next to each letter, which participants used to indicate the order of the series of letters. After answers were filled in, a screen presenting the number of correct letters (“You answered \_\_\_ out of \_\_\_ letters correctly”) and the number of incorrect sentences (“You made \_\_\_ sentence errors for this

trial”) was shown. In the corner of the screen, a percentage indicated the participant’s overall rate of correctly identified sentences to enhance participants’ motivation. In addition, an instructional screen at the start of the test specified that giving the correct answer to the validity of the sentences was “very important” in the task. The task contained an extensive practice phase as well as a detailed procedural section that informed participants what would be presented to them. This task measures individuals’ working memory capacity, which could potentially affect individuals’ DRF. This task was included to assure that participants in the two groups (i.e., high-and average capacity groups) did not differ in their working memory capacity.

#### Questionnaires

Participants completed a series of questionnaires. The Center for Epidemiological Study-Depression (CES-D; Radloff, 1977) is a measure widely used to assess depressive symptoms. It consists of 20 items inquiring whether the participant has felt a certain way in the past two months on a 4-point Likert scale ranging from zero (rarely, or less than three days in the past two months) to three (most of the time, or four weeks or more). The Balanced Inventory of Desirable Responding (BIDR; Li & Bagger, 2007) assesses social desirability, a construct similar to suggestibility. The BIDR also uses a 4-point Likert scale ranging from one to four.

The trait version of the State-Trait Anxiety Inventory (STAI; Spielberger et. al., 1983) measures anxious personality traits and tendencies. This 20-item questionnaire asks participants to indicate how close to each statement (e.g., “I feel like a failure”) they *generally* feel by answering on a 4-point Likert scale ranging between one (almost never) and four (almost always). The Pittsburgh Sleep Quality Index (Buysse et. al., 1988)

measures quality of sleep and sleep habits over 13 questions. The last four questions assess participants' sleep dream habits, measuring DRF, vividness, lucid dream frequency, and presence of roommates or bedmates.

Participants who chose to participate in the second phase of the study were given a dream log to record their dreams in. The dream log was specifically created for this study. The log included an entry for each of the seven consecutive days required for the study, and a space for the date of each day that dream activity was recorded. Items included in the dream log were as follows: Time of awakening, length of sleep, number of dreams remembered (answers for these three items entered in comment spaces), degree of lucidity, length of dreams remembered, and quality of sleep (entered on 5-point Likert scales). In addition, emotions experienced during dreams, and (optional) additional comments (answered with larger comment spaces) were collected.

#### Brain Frequency Electrograph

Participants who chose to complete the second phase of the study were presented with what they were told was a "Brain Frequency Electrograph" (BFE), an instrument that is purportedly used to measure brain waves of all different frequencies. They were informed that its use in this study was to measure their "dream capacity." Two electrodes were placed on their heads (one near each temple) that they were led to believe were sending information to a nearby computer. The electrodes were, in fact, taped to the underside of the computer desk. The cover story regarding the BFE was used to instill the suggestion of a heightened dream capacity or a normal one, depending on which group the participant was assigned to. After "readings" were taken with the BFE, participants

were provided with the results consistent with their condition assignment (see the Procedure section below).

#### Procedure

Students signed up for the study by booking times on [www.experimetrix.com](http://www.experimetrix.com), a site used to schedule experimental sessions conducted in the Department of Psychology at UMaine. The page for this study listed a number of available times for appointment, as well as a brief description about the experiment's purpose and procedure:

“The session will take about an hour and you will receive one credit for your participation. In this study, you will complete a memory task and a set of questionnaires. You will also have the option to participate in a second, paid at-home follow up. If you choose to participate, you will be asked to record the frequency of your dreams every morning upon waking for the week following the session. You will receive \$10 compensation upon returning the completed log to the researcher. This experiment will only be available until the end of March. If you have questions, contact Jack Obery at [jack.obery@umit.maine.edu](mailto:jack.obery@umit.maine.edu).”

Upon arriving in the laboratory, participants were greeted and informed in writing and verbally about the nature of the study. Voluntary participation was emphasized, and the experimenter stressed the option that the participant could terminate the session at any time with no explanation needed. Each participant was given two copies of the study's consent form, which outlined the objectives of the study and detailed what the participant

would be asked to do during the session. The consent form featured a section asking whether the participant would like to take part in the second, optional phase of the study. One copy of the signed consent form was handed back to the experimenter, and participants kept the other copy.

Participants first completed the RSPAN task, which took about 20 minutes on average to complete. Once the instructional and practice phases were completed, the experimenter left the room. After the RSPAN task, participants completed the questionnaires listed above. The experimenter remained in the testing room for the duration of the questionnaire phase of the study, which participants completed in about 10 minutes.

The completion of the questionnaires concluded the first part of the study, at which point participants were asked again if they would like to participate in the second, optional phase of the study. Participants who agreed to participate in the second phase were presented with the two electrodes that purportedly transmitted their brain frequency signals to the brain frequency electrograph (BFE). Participants were informed that the BFE measures brain waves of all frequencies, and that it would be used in this study to measure their “dream capacity.” An electrode was attached to each of their temples, at which point they were asked to close their eyes and remain as still as possible.

Once the electrodes were attached, the researcher moved to an adjacent room, where he supposedly took readings from a computer that the BFE was attached to. Upon reentering the room, the researcher recited a script based on the group of the participant. For the high dream capacity group, the researcher said:

*“Your dream capacity is extremely high. Not only do you dream more frequently than most people, you have the ability to remember more dreams than anyone measured in this study so far. The fact that you don’t often remember them is fairly normal; however, if you try to remember them, and fill out this dream log every morning when you wake up, you’ll be able to remember more dreams.”*

For those in the normal dream capacity group:

*“Your dream capacity is normal, not too low or too high. While you do dream every night, certain periods of your sleep cycle yield more dreams than others. The fact that you don’t often remember them is fairly normal; however, if you try to remember them, and fill out this dream log every morning when you wake up, you’ll be able to remember many more dreams.”*

Participants were then given a copy of the dream log described earlier. They were instructed to take a few minutes every morning, before getting out of bed, to think about any and all dreams they had the night before, for seven *consecutive* mornings. The researcher discussed each item on the dream log in depth and clarified what responses should entail. A specific script was recited in respect to the “# of dreams remembered” item to ensure participants could use the same rule to count the number of dreams they had each night:

“There can be some confusion in deciding where one dream ends and another begins if you don’t wake up between obviously separate and distinct dreams. But if you’re in a different environment with different people experiencing different emotions, it’s a different dream, even if the first dream flows seamlessly into the second. Any questions?”

At the end of the seven days, participants returned the completed dream journals to the researcher, at which point they were debriefed about the nature of the study. Participants were first asked whether they suspected that there might have been deception involved. The researcher asked:

“Do you think there may have been more to this experiment than meets the eye? [Asked to elaborate on the answers] When you were told that you have a high [or average] capacity to remember dreams last week, how much did you believe it? On a 1-4 scale, 1 being “not at all” and 4 being “completely,” how much did you believe what you were told?”

“The study you have been participating in was not actually designed to examine whether certain personality factors correlate to dream recall frequency. Its main purpose was to determine whether the power of suggestion had any impact on the number of dreams a person remembered. The brain frequency electrograph you were told gave brain readings

during your first session in the lab was not actually reading anything; your dream capacity was randomly assigned to you before you even walked in. I hope you understand that this form of deception was critical in instilling the suggestion of a certain dream capacity, and any knowledge of the true nature of the experiment would have greatly altered the results. Please do not discuss this study with anyone else. If people know that the BFE is fake ahead of time, we will not be able to obtain valid data. Thank you for your time and participation in this study.”

Participants who completed the first part of the study received one credit towards completion of the course; those who also successfully completed the second phase of the study received \$10 in addition to the one credit.

## RESULTS

### Participant Characteristics

Nineteen participants (8 men and 11 women) completed the first part of the study. All participants were 18 years or older. Of the 19 participants, 8 participants (4 males, 4 females) completed the second phase of the study. A series of independent samples *t*-tests were conducted to examine whether the high and average dream capacity groups differed in variables that have been, albeit inconsistently, associated with DRF in previous research (Alcaraz, 1970; Duke & Davidson, 2002). More specifically, potential group differences in anxiety, depression, and suggestibility, which were measured by the CES-D, STAI, and BIDR, respectively, were examined. None of the analyses yielded

significant results (all  $ps > .29$ ), indicating that the two groups did not differ in these variables, as shown in Table 1.

**Table 1.** Participant characteristics.

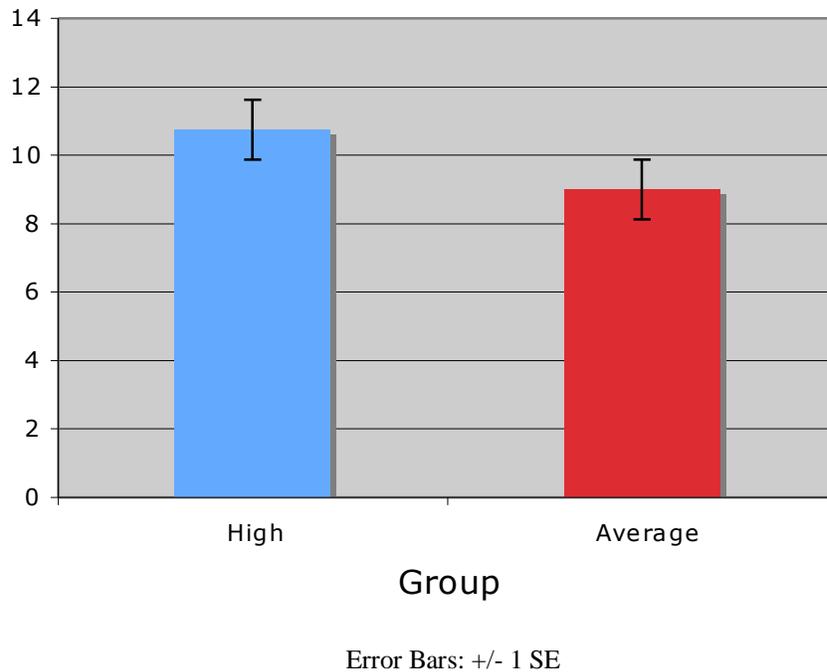
Questionnaire	Avg.	High
STAI		
Mean	50.00	49.33
Std. Deviation	9.85	5.77
CES-D		
Mean	42.67	34.67
Std. Deviation	11.24	1.15
BIDR		
Mean	103.33	95.00
Std. Deviation	7.64	12.17

STAI: State-Trait Anxiety Inventory; CES-D: Center for Epidemiological Study- Depression; BIDR: Balanced Inventory of Desirable Responding

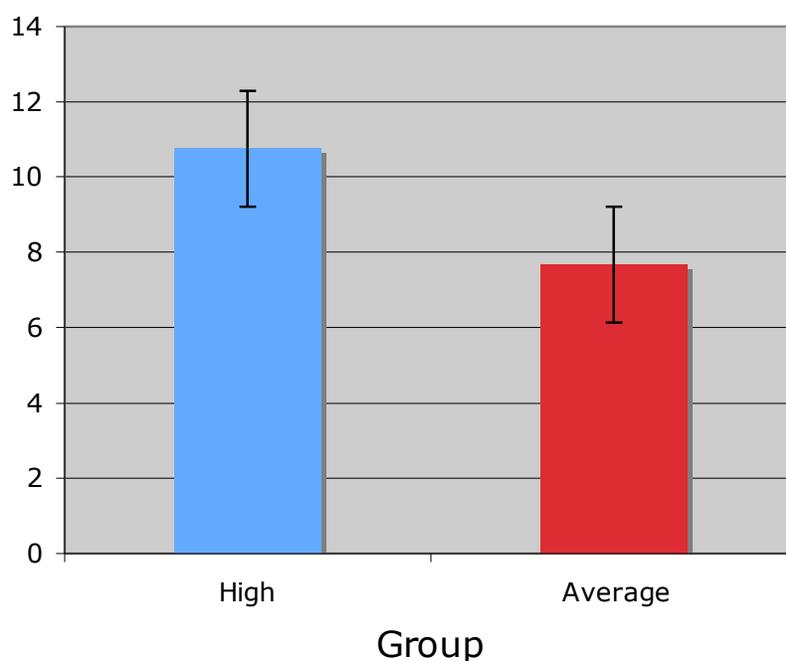
#### Dream Recall Frequency (DRF)

To test the hypothesis of whether the high capacity group remembered more dreams than the average capacity group, an independent samples  $t$ -test was conducted to compare the two groups regarding the total number of dreams throughout the study week. While there were no significant differences between the groups in DRF ( $t(6) = .95$ ,  $p = .38$ ), the pattern of results was consistent with the hypothesis. That is, the high capacity group reported a higher dream recall ( $M = 10.75$ ,  $SD = .96$ ) than the average capacity group ( $M = 9.00$ ,  $SD = 3.56$ ), as presented in Figure 1.

**Figure 1.** Total number of dreams throughout the week between participant groups.



There was, however, one outlier in the average capacity group. One participant exhibited a higher dream recall than the rest of the participants in the average capacity group. When asked about the participant's abnormally high DRF, during debriefing, the participant informed the researcher that DRF reported during the study week was not out of the ordinary based on past DRF levels. Given this participant's unusually high DRF, data were reanalyzed excluding this person's data (i.e., an outlier). The DRF of the average capacity group decreased once the outlier was removed ( $M= 7.67$ ,  $SD= 2.89$ ), but the group difference was still not significant,  $t(5)= 2.05$ ,  $p= .10$ .



Error Bars: +/- 1 SE

#### Relation between DRF and anxiety and depression

To examine the relation between anxiety and depression and DRF, Pearson correlation coefficients were examined. Participants' scores on the STAI and the CES-D were correlated with their total number of dreams. Neither anxiety ( $r = .25, p = .55$ ) nor depression ( $r = -.02, p = .96$ ) were significantly associated with the total number of dreams. The pattern of results, however, indicates that individuals with high levels of anxiety reported a higher DRF than individuals with lower anxiety levels.

#### Working Memory Capacity

Bivariate correlation analysis was conducted to examine the relation between DRF and working memory capacity. The sum of all correct responses when recalling letter sequences during the RSPAN task was used as an index of working memory capacity. Working memory capacity was not significantly associated with participants'

DRF ( $r = -.08, p = .85$ ). The pattern suggests that an individuals' working memory capacity was not associated with their DRF.

## DISCUSSION

The present study examined whether the effects of suggestion could influence a participant's DRF. I hypothesized that instilling a suggestion of a high dream capacity would lead to a greater DRF for the week following the initial lab session than instilling the suggestion of an average dream capacity. While I did not obtain statistically significant findings, the pattern of results was consistent with the hypothesis. With a larger sample size, one might obtain statistically significant results.

Both the high capacity and average capacity groups were asked to complete the RSPAN memory task and a series of questionnaires prior to the second phase of the study to assess their working memory capacity as well as their anxiety, depression, and suggestibility levels. Given that some previous studies have implicated that these factors are associated with DRF, they were assessed (a) to ensure that the two groups did not differ on these factors, and (b) to examine the relations between each of these factors with DRF. None of the factors had a significant correlation to DRF, suggesting that anxiety, depression, and working memory capacity were not significantly associated with DRF. However, anxiety and DRF were associated to an extent, suggesting that a lack of power due to small sample size might have led to statistically non-significant results.

### Limitations of the present study

Any study concerning the content or recall of dreams is not without inherent limitations, as the only available method of data collection (i.e., self-report) is difficult to validate in and of itself. Furthermore, when examining DRF, it is simply not possible to

corroborate the accuracy of a participant's recall. Therefore, researchers have no choice but to trust the participant's judgment and honesty. Similarly, the accuracy of a participant's answers on the questionnaires completed in the first part of the study could be equally misleading when attempting to correlate DRF with anxiety, depression, or recent sleep patterns.

Because DRF was operationally defined as the number of dreams a participant remembered over the week after the lab session, issues could arise in discerning where one dream ended and the next began, especially when dreams were not divided by a waking period. Therefore, individual differences in their perception of what constitutes a dream "transition" (when one phase of a dream seamlessly flows into another phase) vs. an entirely different dream could have confounded data. The researcher, however, provided an explicit explanation about how to determine the separation of different dreams to participants to minimize the effects of individual differences in the perception of dream transition.

The current study was a single-blind study in which the researcher was fully aware of the study hypotheses and participants' condition assignment. It is thus possible that the researcher's expectancy could have affected the results. After the BFE "readings" were taken, the researcher had to report the fabricated findings to the participant and give a 3- to 5-minute explanation of the various parts of the dream log. The amount of time spent in one-on-one conversation with the participant while knowing which group they belonged to could have facilitated an unintended, differential treatment of participants randomly assigned to the respective groups. For example, a more positive and affirmative approach to those in the high capacity group could motivate them to put an extra effort

into the completion of their dream logs. The researcher, however, was aware of this possibility and followed scripts as closely as possible, while also talking to all participants in the same manner.

I originally targeted to recruit between 40 and 50 participants; however, a significantly smaller number signed up to participate. A number of factors could have contributed to this. First, there were many more studies conducted at the University of Maine this semester (Spring 2012) than have been conducted in the past. Since more studies were competing for the limited pool of available participants who only needed a certain amount of participation credits, studies conducted in Spring 2012 in general had difficulties recruiting participants. Second, the current study only offered one research credit to prospective participants (not including the \$10 compensation for completing the second phase). There were other, albeit longer, studies that rewarded participants with more research credits, which might have been more attractive to potential participants. Finally, I could not run this study during the very end of the semester, because participants needed an extra week to complete the dream log. Many students, however, put off gaining their research credits until the final week or two of class, when participation in all studies increases significantly. In attempt to offset this effect, a notice was posted to the study's page on [www.experimatrix.com](http://www.experimatrix.com) that read, "This study will only run until the end of March," to encourage potential participants to participate early. Unfortunately, this strategy was not effective. On March 21<sup>st</sup> the post was removed and the researcher continued to run participants.

Although the results of the present study showed a pattern consistent with the hypothesis, results were not statistically significant. It is suspected that a lack of power

due to small sample size was at fault for non-significant findings. Had participation rate been higher, there could have been enough data to reveal a significant difference between the high capacity group and the low capacity group.

There are a number of changes that the researcher would consider making if given the opportunity to do the study again. First, to increase the number of participants, a slightly higher monetary compensation could be offered. A \$15 monetary compensation could have increased participation rate in the second phase of the study, and even recruited participants who weren't attracted to the study to begin with. However, this strategy might not have dramatically increased the number of participants. When I asked several participants who declined to participate in the second phase whether they would like to participate if the compensation were \$15, they still declined to participate. A possible compensation of \$20 would be too high for the amount of work being done, and could have motivated participants to complete dream logs in an invalid or falsified way just to receive the \$20.

Secondly, making the second phase mandatory would have increased participation in that part of the study for obvious reasons. As the study was run, the long and sometimes tedious memory task and questionnaire could have deterred participants from continuing to participate in the study once their participation was no longer required. In an initial attempt to combat this effect, there was a section on the consent form that let participants indicate their participation by checking a "yes" or "no" box under the statement: "I agree to participate in the second phase of the study and get paid \$10 for my participation." However, many participants did not check either box, because they were

not sure if they wanted to complete the second phase or because they did not see the boxes.

Lastly, many participants noted in the debriefing section that their DRF declined as more time passed between when they came in for the initial lab session and when they would wake up each morning to complete their dream log. Most participants attributed this decline to the fact that the lab session was no longer fresh in their minds, and that they were not thinking about their dreams or their dream capacity quite as much during the day. If the study were to be run again, the researcher could ask participants to fill out certain parts of the dream log *directly before* falling asleep. A response space for “Time you laid down to go to bed” would have been added to the very top of each log entry, so the participant would be thinking about the dream log and their potential dreams right before they laid down to go to sleep. This addition to the study could provide control against the participants’ supposed dream capacity and the lab session itself becoming a weaker presence in their minds as the week went on.

Despite these limitations, the current study obtained results suggesting that, with a larger sample size, those given the suggestion of a heightened dream capacity show a significantly higher DRF than those given the suggestion of an average dream capacity. A follow up study could not only include a larger sample, but could also examine more aspects of the dream state (e.g., suggestion for content, length, or lucidity) and could include an updated procedure for producing higher DRF (e.g., more believable deception and a better control for extraneous variables) in participants. The major implication of this study is a usable method for inducing higher DRF in participants taking part in future studies. Any line of research in which a capacity for remembering dreams is required as a

means to the end of researching different aspects of the dreaming state (i.e., content, physiology of the brain during dreaming, research in lucid dreaming) could apply the procedure used in this study in order to increase their participants' DRF.

## REFERENCES

- Ajilore, O. A., Stickgold, R., Rittenhouse, C. and Hobson, J. A. (1995). Nightcap: laboratory and home-based evaluation of a portable sleep monitor. *Psychophysiology*, 32, 92-98.
- Alcaraz, V. M. (1970). Repercussions of anxiety on Phase I REM sleep. *Revista De La Clinica De La Conducta*, 3(6), 11-22.
- Aserinsky, E., & Kleitman, N. (1953). Regularly occurring periods of eye motility and concomitant phenomena during sleep. *Science*, 118, 273–274.
- Barber, T. X., Walker, P. C., & Hahn, K. W. (1973). Effects of hypnotic induction and suggestions on nocturnal dreaming and thinking. *Journal of Abnormal Psychology*, 82, 414-427.
- Beaulieu-Prévost, D., & Zadra, A. (2005). How Dream Recall Frequency Shapes People's Beliefs About the Content of Their Dreams. *North American Journal Of Psychology*, 7(2), 253-264.
- Blagrove, M.T. & Akehurst, L. (2000). Personality and dream recall frequency: Further negative findings. *Dreaming*, 10, 139–148.
- Brand, S., Beck, J., Kalak, N., Gerber, M., Kirov, R., Pühse, U., & Holsboer-Trachsler, E. (2011). Dream recall and its relationship to sleep, perceived stress, and creativity among adolescents. *Journal Of Adolescent Health*, 49(5), 525-531.
- Bulkeley, K. (2006). Sleep and dream patterns of political liberals and conservatives. *Dreaming: Journal of the Association for the Study of Dreams*, 16(3), 223-235.
- Bulkeley, K. (2011). Dream recall and political ideology: Results of a demographic survey. *Dreaming*. Advance Online Publication.
- Burnett, R. (2008). The effects of presleep suggestions on dream affect. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 68(7-B), 4812.
- Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., and Kupfer, D. J. (1988). The Pittsburgh Sleep Quality Index: A New Instrument for Psychiatric Practice and Research. *Psychiatry Research*, 28, 193-213.
- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The

- BIS/BAS Scales. *Journal of Personality and Social Psychology*, 67, 319-333.
- Chase, R. M., & Pincus, D. B. (2011). Sleep-related problems in children and adolescents with anxiety disorders. *Behavioral Sleep Medicine*, 9(4), 224-236.
- Chellappa, S., Frey, S., Knoblauch, V., & Cajochen, C. (2011). Cortical activation patterns herald successful dream recall after NREM and REM sleep. *Biological Psychology*, 87(2), 251-256.
- Cory, T. L., Ormiston, D. W., Simmel, E., & Dainoff, M. (1975). Predicting the frequency of dream recall. *Journal Of Abnormal Psychology*, 84(3), 261-266.
- Daneman, M., & Carpenter, P. A. (1980). Individual differences in working memory and reading. *Journal of Verbal Learning and Verbal Behavior*, 19(4), 450-466.
- De Gennaro, L., Marzano, C., Cipolli, C., & Ferrara, M. (2011). How we remember the stuff that dreams are made of: Neurobiological approaches to the brain mechanisms of dream recall. *Behavioural Brain Research*, 226(2), 592-596.
- "Dream - Free Merriam-Webster Dictionary." Merriam-Webster Online. Web. 10 Jan. 2012. <<http://www.merriam-webster.com/dictionary/dream>>.
- Duke, T., & Davidson, J. (2002). Ordinary and recurrent dream recall of active, past and non-recurrent dreamers during and after academic stress. *Dreaming*, 12(4), 185-197.
- Edge, L. C. (2010). The role of emotional brain processing during sleep in depression. *Journal Of Psychiatric And Mental Health Nursing*, 17(10), 857-861.
- Farthing, G. William, Venturino, M., & Brown, S. W. (1984). Suggestion and distraction in the control of pain: Test of two hypotheses. *Journal Of Abnormal Psychology*, 93(3), 266-276.
- Goodenough, B. B., Kampel, L. L., Champion, G. D., Laubreaux, L. L., Nicholas, M. K., Ziegler, J. B., & McInerney, M. M. (1997). An investigation of the placebo effect and age-related factors in the report of needle pain from venipuncture in children. *Pain*, 72(3), 383-391.
- Gregory, A. M., Buysse, D. J., Willis, T. A., Rijdsdijk, F. V., Maughan, B., Rowe, R., & Eley, T. C. (2011). Associations between sleep quality and anxiety and depression symptoms in a sample of young adult twins and siblings. *Journal*

*Of Psychosomatic Research*, 71(4), 250-255.

Halliday, G. G. (1992). Effect of encouragement on dream recall. *Dreaming*, 2(1), 39-44.

Hartmann, E. (1989). Boundaries of dreams, boundaries of dreamers: Thin and thick boundaries as a new personality measure. *Psychiatric Journal of the University of Ottawa*, 14, 557-560.

Kirsch, I. & Sapirstein, G. (1998). Listening to Prozac but hearing placebo. *Prevention and Treatment*, 1 (2).

Landsness, E. C., Goldstein, M. R., Peterson, M. J., Tononi, G., & Benca, R. M. (2011). Antidepressant effects of selective slow wave sleep deprivation in major depression: A high-density EEG investigation. *Journal Of Psychiatric Research*, 45(8), 1019-1026.

Leshan, L. L. (1942). The breaking of a habit by suggestion during sleep. *The Journal Of Abnormal And Social Psychology*, 37(3), 406-408.

Levin, R., Fireman, G., & Rackley, C. (2003). Personality and dream recall frequency: Still further negative findings. *Dreaming*, 13(3), 155-162.

Li, Andrew, & Bagger, Jessica. (2007). The Balanced Inventory of Desirable Responding(BIDR): A Reliability Generalization Study. *Educational and Psychological Measurement*, 67 (3), 525-44.

Neumann, W. W., Kugler, J. J., Seelbach, H. H., & Kruskemper, G. M. (1997). Effects of nondirective suggestions on pain tolerance, pain threshold and pain intensity perception. *Perceptual And Motor Skills*, 84(3, Pt 1), 963-966.

Nikles II, C. D., Brecht, D. L., Klinger, E., & Bursell, A. L. (1998). The effects of current- concern- and nonconcern-related waking suggestions on nocturnal dream content. *Journal Of Personality And Social Psychology*, 75(1), 242-255.

Pace-Schott, E. F., Gersh, T., Silvestri, R., Stickgold, R., Salzman, C., & Hobson, J. (2001). SSRI treatment suppresses dream recall frequency but increases subjective dream intensity in normal subjects. *Journal Of Sleep Research*, 10(2), 129-142.

Palagini, L., Gemignani, A., Feinberg, I., Guazzelli, M., & Campbell, I. G. (2004). Mental activity after early afternoon nap awakenings in healthy subjects. *Brain Research Bulletin*, 63(5), 361-368.

Price, D. D., Craggs, J., Verne, G., Perlstein, W. M., & Robinson, M. E. (2007).

Placebo analgesia is accompanied by large reductions in pain-related brain activity in irritable bowel syndrome patients. *Pain*, 127(1-2), 63-72.

Put, C., Van den Bergh, O., Van Ongeval, E., De Peuter, S., Demedts, M., & Verleden, G. (2004). Negative affectivity and the influence of suggestion on asthma symptoms. *Journal Of Psychosomatic Research*, 57(3), 249-255.

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385-401.

Rosa, R. R., Bonnet, M. H., & Kramer, M. (1983). The relationship of sleep and anxiety in anxious subjects. *Biological Psychology*, 16(1-2), 119-126.

Rundell, O. H., Lester, B. K., Griffiths, W. J., & William, H. L. (1972). Alcohol and sleep in young adults. *Psychopharmacologia*, 26(3), 201-218.

Schredl, M. (2010). Explaining the gender difference in dream recall frequency. *Dreaming*, 20(2), 96-106.

Schredl, M., & Lahl, O. (2010). Gender, sex role orientation, and dream recall frequency. *Dreaming*, 20(1), 19-24.

Schredl, M., & Montasser, A. (1996-97a). Dream recall: State or trait variable? Part I: Model, theories, methodology and trait factors. *Imagination, Cognition and Personality*, 16, 181-210.

Schredl, M., Ciric, P., Götz, S., & Wittmann, L. (2003). Dream recall frequency, attitude towards dreams and openness to experience. *Dreaming*, 13(3), 145-153.

Spanos, N. P., McNeil, C., Gwynn, M. I., & Stam, H. J. (1984). Effects of suggestion and distraction on reported pain in subjects high and low on hypnotic susceptibility. *Journal Of Abnormal Psychology*, 93(3), 277-284.

Spanos, N. P., Stam, H. J., Radtke, H. L., & Nightingale, M. E. (1980). Absorption in imaginings, sex-role orientation and the recall of dreams by males and females. *Journal of Personality Assessment*, 44, 227-282.

Spielberger, C.D., Gorsuch, R.L., Lushene, P.R., Vagg, P.R., Jacobs, A.G. (1983). Manual for the State-Trait Anxiety Inventory (Form Y). *Consulting Psychologists Press, Inc.:* Palo Alto.

Staats, P., Hekmat, H., & Staats, A. (1998). Suggestion/Placebo effects on pain: Negative as well as positive. *Journal Of Pain And Symptom Management*, 15(4), 235-243.

- Stacher, G. (1975). Effects of suggestion of relaxation or analgesia on pain threshold and pain tolerance in the waking and in the hypnotic state. *Journal Of Psychosomatic Research*, 19(4), 259-265.
- Wilson, K. (2011). The Power Of Suggestion. *The Psychologist*, 24 (10): 782-783.
- Wolcott, S., & Strapp, C. M. (2002). Dream recall frequency and dream detail as mediated by personality, behavior, and attitude. *Dreaming*, 12(1), 27-44.

## Appendix: A

### **Dream Recall Frequency Study**

#### **Informed Consent Form – Study session (Psy 100)**

You are invited to participate in a research project being conducted by Jack Obery, an undergraduate Psychology student at the University of Maine, with Dr. Lira Yoon as a faculty advisor. The purpose of the research is to investigate any correlations between certain personalities/ behavioral tendencies and dream recall frequency. You must be at least 18 years of age to participate.

#### **What Will You Be Asked To Do?**

If you decide to participate, you will be asked to have measurements taken on a Brain Frequency Electrograph (a machine that can measure inherent dream capacity), and complete a brief computerized memory task. You will also complete a series of questionnaires concerning stress and anxiety (e.g., “Do you worry about making mistakes?”. “Is it ever hard for you to shut off a disturbing thought?”). This initial meeting will last about an hour. You will then be given the option of a paid, at-home follow-up, being asked to record various details about your sleep schedule and frequency of dreams every morning for one week. If you choose to participate in the second part, you will meet back with the researcher to turn in your dream log and engage in a brief follow-up meeting at the end of the week. This last session will last less than half an hour.

#### **Risks**

- There is the possibility that you may be uncomfortable disclosing the details of some dreams you are asked to record, or answering some of the questionnaire items. You have the right to keep any details you aren't comfortable with sharing to yourself.

#### **Benefits**

- No benefits can be promised to you from your participation in this study. However, your participation will help us better understand the nature of relationships between personality and dream recall frequency.

#### **Compensation**

- You will receive 1 hour of research credit for participating in this study. If you participate in the second part of the study, you will receive \$10 at the end of the week only if you complete the dream log for 7 consecutive days; if not, you will still receive the 1 course credit for completing the first part of the study.

**Confidentiality**

Your name will not be on any of the documents. A code number will be used to protect your identity. Study files will be labeled with an ID number in place of a name and will be maintained in a locked office. Electronic files will be maintained with password protection. Your name or other identifying information will not be reported in any publications. The key linking your name to the data will be destroyed after data analysis is complete (after the Spring 2012 semester), but the researcher will keep the data, which only contains an ID number instead of your name, indefinitely.

**Voluntary**

Participation is entirely voluntary. You are free to refuse to participate in the study or withdraw your consent at any time during the study without giving a reason. You may skip any portion of the study you do not wish to be a part of. If you decide to withdraw, you might not receive one credit. That is, if you do not complete the computer task and thus spend less than 30 minutes with us, you will not receive the credit.

**Contact Information**

If you have any questions about this session, please contact Jack Obery (email: jack.obery@umit.maine.edu). If you have any questions about your rights as a research participant, please contact Gayle Jones, Assistant to the University of Maine's Protection of Human Subjects Review Board at 581-1498 (or email: gayle.jones@umit.maine.edu).

**Second Part of the Study**

I agree to participate in the second part of the study and get paid \$10 for my  
 Yes       No      participation.

Your signature below indicates that you have read and understand the above information. You will receive a copy of this form.

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

## Appendix: B

## CES-D

Instructions: Below is a list of ways people sometimes feel or behave. For each item, please think and indicate how often or how consistently you have felt or behaved this way during THE PAST TWO MONTHS by circling the appropriate response number.

---

During the past two months:

0 = RARELY (less than 3 days over the past two months)

1 = SOMETIMES (a total of 3- 7 days spread out over the past two months)

2 = OFTEN (a total of 1- 4 weeks over the past two months)

3 = MOST OF THE TIME (4 weeks or more)

---

1. I was bothered by things that usually don't bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor.	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends.	0	1	2	3
4. I felt that I was just as good as other people.	0	1	2	3
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future.	0	1	2	3
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not get "going".	0	1	2	3

## Appendix: C

**Balanced Inventory of Desirable Responding (BIDR)**

Choose the response that indicates the extent to which you agree or disagree with each statement, and code it on your answer sheet:

- 1 = I agree a LOT
- 2 = I agree a LITTLE
- 3 = I disagree a LITTLE
- 4 = I disagree a LOT

1. My first impressions of people usually turn out to be right.
2. It would be hard for me to break any of my bad habits.
3. I don't care to know what other people really think of me.
4. I have not always been honest with myself.
5. I always know why I like things.
6. When my emotions are aroused, it biases my thinking.
7. Once I've made up my mind, other people can seldom change my opinion.
8. I am not a safe driver when I exceed the speed limit.
9. I am fully in control of my own fate.
10. It's hard for me to shut off a disturbing thought.
11. I never regret my decisions.
12. I sometimes lose out on things because I can't make up my mind soon enough.
13. The reason I vote is because my vote can make a difference.
14. My parents were not always fair when they punished me.
15. I am a completely rational person.
16. I rarely appreciate criticism.
17. I am very confident of my judgments.
18. I have sometimes doubted my ability as a lover.
19. It's all right with me if some people happen to dislike me.
20. I don't always know the reasons why I do the things I do.
21. I sometimes tell lies if I have to.
22. I never cover up my mistakes.
23. There have been occasions when I have taken advantage of someone.
24. I never swear.
25. I sometimes try to get even rather than forgive and forget.
26. I always obey laws, even if I'm unlikely to get caught.
27. I have said something bad about a friend behind his or her back.
28. When I hear people talking privately, I avoid listening.
29. I have received too much change from a salesperson without telling him or her.
30. I always declare everything at customs.
31. When I was young I sometimes stole things.
32. I have never dropped litter on the street.
33. I sometimes drive faster than the speed limit.
34. I never read sexy books or magazines.
35. I have done things that I don't tell other people about.

36. I never take things that don't belong to me.
37. I have taken sick leave from work or school even though I wasn't really sick.
38. I have never damaged a library book or store merchandise without reporting it.
39. I have some pretty awful habits.
40. I don't gossip about other people's business.

## Appendix: D

## TANX

<b>Directions</b>				
A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate you <i>generally</i> feel.	<b>Almost Never</b>	<b>Sometimes</b>	<b>Often</b>	<b>Almost Always</b>
21. I feel pleasant	1	2	3	4
22. I feel nervous and restless.	1	2	3	4
23. I feel satisfied with myself.	1	2	3	4
24. I wish I could be as happy as other seem to be.	1	2	3	4
25. I feel like a failure.	1	2	3	4
26. I feel rested.	1	2	3	4
27. I am "calm, cool, and collected".	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them.	1	2	3	4
29. I worry too much over something that really doesn't matter.	1	2	3	4
30. I am unhappy.	1	2	3	4
31. I have disturbing thoughts.	1	2	3	4
32. I lack self-confidence.	1	2	3	4
33. I feel secure.	1	2	3	4
34. I make decisions easily.	1	2	3	4
35. I feel inadequate.	1	2	3	4
36. I am content.	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me.	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind.	1	2	3	4
39. I am a steady person.	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests.	1	2	3	4

## Appendix: E

## Pittsburgh Sleep Quality Index (PSQI)

**Instructions:**

The following questions relate to your usual sleep habits during the past month *only*. Your answers should indicate the most accurate reply for the majority of days and nights in the past month.

You may skip any questions you don't feel comfortable answering.

1. During the past month, when have you usually gone to bed at night?

USUAL BED TIME \_\_\_\_\_

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

NUMBER OF MINUTES \_\_\_\_\_

3. During the past month, when have you usually gotten up in the morning?

USUAL GETTING UP TIME \_\_\_\_\_

4. During the past month, how many hours of *actual sleep* did you get at night?  
(This may be different than the number of hours you spend in bed)

HOURS OF SLEEP PER NIGHT \_\_\_\_\_

For each of the remaining questions, check the one best response. You may skip any questions you don't feel comfortable answering.

5. During the past month, how often have you had trouble sleeping because you...

- (a) Cannot get to sleep within 30 minutes

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_      Three or more times a week \_\_\_\_\_

- (b) Wake up in the middle of the night or early morning

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_      Three or more times a week \_\_\_\_\_

- (c) Have to get up to use the bathroom

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_      Three or more times a week \_\_\_\_\_

- (d) cannot breathe comfortably

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_

Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

(e) Cough or snore loudly

Not during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

(f) Feel too cold

Not during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

(g) Feel too hot

Not during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

(h) Had bad dreams

Not during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

(i) Have pain

Not during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

(j) Other reasons, please explain \_\_\_\_\_

Not during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

6. During the past month, how would you rate your sleep quality overall?

Very good \_\_\_\_\_

Fairly good \_\_\_\_\_

Fairly bad \_\_\_\_\_

Very bad \_\_\_\_\_

7. During the past month, how often have you taken medicine (prescribed or “over the counter”) to help you sleep?

Not during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Not during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all \_\_\_\_\_ Only a very slight problem \_\_\_\_\_  
 Somewhat of a problem \_\_\_\_\_ A very big problem \_\_\_\_\_

10. How many nights, on average, do you remember having one or more dreams?

Not once during the past month \_\_\_\_\_ Less than once a week \_\_\_\_\_  
 Once or twice a week \_\_\_\_\_ Three or more times a week \_\_\_\_\_

11. How vivid was the last dream you remember?

Very vivid \_\_\_\_\_ Fairly vivid \_\_\_\_\_  
 Not very clear \_\_\_\_\_ Not clear at all \_\_\_\_\_

12. How often do you have a lucid dream (being aware that you're dreaming)?

At least once a week \_\_\_\_\_ At least once a month \_\_\_\_\_  
 At least once a year \_\_\_\_\_ Less than once a year/never \_\_\_\_\_

13. Do you have a bed partner or roommate?

No bed partner or roommate \_\_\_\_\_ Partner/roommate in other room \_\_\_\_\_  
 In same room, but not same bed \_\_\_\_\_ Partner in same bed \_\_\_\_\_

## Appendix: F

Each participant received a packet containing seven copies of this dream log:

ID CODE \_\_\_\_\_ Dream Log Date \_\_\_\_\_

Day  
1 2 3 4 5 6 7

Woke up at \_\_\_\_\_ How long you slept \_\_\_\_\_

# of Dreams remembered \_\_\_\_\_

## Degree of Lucidity

This measure asks if you had any dreams in which you were aware of dreaming. If you had more than one lucid dream, refer to your most lucid dream of the night. If you didn't have one, circle "Not Lucid." If you sustained a dream while lucid and delayed waking up, circle "Very Lucid."



## Emotions

Here, you can write any emotions you feel comfortable sharing from any of your dreams. For example, "anxious that I was late for work" or simply just "happy" or "relaxed":

---

## Length of Dreams remembered

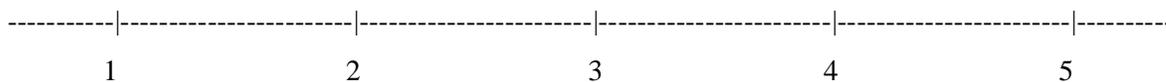
A very short dream would feel like 15 seconds or less, and a very long dream would feel like 5+ minutes. Rate the length of your longest dream remembered.



Day  
1 2 3 4 5 6 7  
cont.

### Quality of Sleep

A “1” on this scale indicates restless sleep, tossing and turning, and multiple awakenings. A “5” would indicate undisturbed, continuous sleep, in which you fell asleep within a half hour or less of laying down and stayed asleep until you woke up.



While other details about sleep/dreaming aren't required, any additional comments (unexpected disturbances, nightmares, roommate waking you up, etc.) can be made below:

Upon returning to the lab for debriefing, the participant returned the completed log to the researcher.

## Appendix G:

Office of the Vice President for  
Research  
*Protection of Human Subjects Review  
Board*



5703 Alumni Hall, Room 114  
Orono, Maine 04469-5703  
Tel: 207-581-1498  
Fax: 207-581-1300  
www.umaine.edu

## MEMORANDUM

TO: Jack Obery

FROM: Gayle Jones  
Assistant to the Institutional Review Board for the Protection of Human Subjects  
(IRB)

SUBJECT: "Effects of Suggestion on Fream Recall Frequency," #2011-10-05

DATE: November 9, 2011

The above referenced project was approved by the University of Maine's Institutional Review Board for the Protection of Human Subjects (IRB) in a full Board review. The approval period is 10/20/2011 through 10/19/2012. A continuing review of this project must be conducted by the IRB before the end of the approval period. Although you will receive a request for this information approximately 6-8 weeks before that date, it is your responsibility to submit the information in sufficient time to allow for review before the approval period expires.

Enclosed is an approved, stamped copy of the consent document for this project. The approval for this consent expires on 10/19/2012. **This approved, stamped copy must be duplicated and used when enrolling subjects during the approval period.**

Please remember that each subject must be given a copy of the consent document. Any unanticipated problems or harm to the subject must be reported to the IRB immediately. Any proposed changes to the research must be approved by the IRB **prior** to implementation. Any significant new findings must be reported to the subject.

If you have questions, please contact me at 1-1498. Thank you.

pc: Lira Yoon

APPLICATION FOR APPROVAL OF RESEARCH WITH HUMAN SUBJECTS  
Protection of Human Subjects Review Board  
114 Alumni Hall, 581-1498

PRINCIPAL INVESTIGATOR: JACK OBERY  
EMAIL: jackobery@umit.maine.edu TELEPHONE: 207-528-0991  
CO-INVESTIGATOR(S):  
FACULTY SPONSOR (Required if PI is a student): LIRA YOON  
TITLE OF PROJECT: EFFECTS OF SUGGESTION ON DREAM RECALL FREQUENCY

START DATE: 11/1/11 PI DEPARTMENT: Psychology  
MAILING ADDRESS: 2 Elm Street Orono, ME 04469  
FUNDING AGENCY (if any): HONORS COLLEGE  
STATUS OF PI:

FACULTY/STAFF/GRADUATE/UNDERGRADUATE

1. If PI is a student, is this research to be performed:

- for an honors thesis/senior thesis/capstone?  for a master's thesis?
- for a doctoral dissertation?  for a course project?
- other (specify)

2. Does this application modify a previously approved project? (Y/N). If yes, please give assigned number (if known) of previously approved project:

3. Is an expedited review requested? (Y/N).

SIGNATURES: All procedures performed under the project will be conducted by individuals qualified and legally entitled to do so. No deviation from the approved protocol will be undertaken without prior approval of the IRB.

Faculty Sponsors are responsible for oversight of research conducted by their students. By signing this application page, the Faculty Sponsor ensures that the conduct of such research will be in accordance with the University of Maine's Policies and Procedures for the Protection of Human Subjects of Research.

10/4/11 \_\_\_\_\_  
Date Principal Investigator Faculty Sponsor

Co-Investigator

Co-Investigator

\*\*\*\*\*  
FOR IRB USE ONLY Application # 2011-10-05 Date received 10/12/2011 Review (F/E): F  
Expedited Category: \_\_\_\_\_

ACTION TAKEN:

- \_\_\_\_\_ Judged Exempt; category \_\_\_\_\_. Modifications required? \_\_\_\_ (Y/N) Accepted (date) \_\_\_\_\_
- \_\_\_\_\_ Approved as submitted. Date of next review: by \_\_\_\_\_. Degree of Risk: \_\_\_\_\_
- Approved pending modifications. Date of next review: by 10/19/11. Degree of Risk: \_\_\_\_\_
- \_\_\_\_\_ Modifications accepted (date): 11/9/2011.
- \_\_\_\_\_ Not approved. (See attached statement.)
- \_\_\_\_\_ Judged not research with human subjects

Date: 10/20/11 Chair's Signature: Cynthia A. Erdley

### Author's Biography

Jack Obery was born in Topsham, Maine on September 4, 1990. He graduated with High Honors from Mt. Ararat High School in Topsham, ME, and enrolled in the Honors College at the University of Maine in August, 2008, where he declared a major in psychology the following year. His undergraduate experience was marked by an immersion in the arts and a passion for psychology, as well as an extra-curricular pursuit of music and finance. He is a member of Psi Chi and Phi Beta Kappa. He received the CLAS Undergraduate Research and Creative Activity Fellowship in support of his work on this research project.

After graduation, Jack will submit his candidacy for the Honors Associate position. He hopes to stay in the Orono area and contribute to the Honors community.