

Cognitive Neuroscience of Lucid Dreaming: Introducing A New Reality Check Induction Protocol - Dream Consciousness Study

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Abstract

Background: During lucid dreaming, a person becomes aware of their own dreaming status. Some experienced lucid dreamers are able to further gain agency within the dream to consciously manipulate the dream's narrative, and characters, direct their own actions and dream's plot. Neurologically, scientists attribute this phenomenon to the brain's parietal lobe activity. Dream lucidity occurrences are rare. To induce them, various cognitive techniques are currently being developed.

Methods: A novel protocol for inducing lucidity was designed by the author, implemented in this study, evaluated for effectiveness, and contrasted with two other induction techniques. Before starting their 10 days experiment, 33 female participants were divided into three equal groups for comparative testing. All completed a pre-study online survey, kept a dream recall diary and a sleep log for the duration of the research project, and filled out a final results survey.

Results: The study compared three methods based on reality testing protocols. The approach involved subjects undertaking reality check tests when awake during the day to help them build a cognitive resource of habitual differentiation to be used when asleep. The reasoning was based on the notion that repetitive daily testing set every two hours eventually becomes incorporated into a person's dream, enabling them to distinguish between sleep and wakefulness realities, which in turn induces dream lucidity. The findings showed that the new protocol performed significantly better than the other two methods. It might have achieved a better outcome due to the incorporation of one additional modality than the other tested methods. The correlation between dream recall abilities was assumed but not tested as a variable.

Conclusions: The research demonstrated the efficacy of the novel induction protocol over the other two investigated methods. Clinical applications of lucid dreaming may include developing new treatments for recurring nightmares, trauma, or for PTSD patients. Findings from dream consciousness research might prove therapeutically useful for neuroimaging techniques, anesthesia awareness, locked-in syndrome, and disorders of consciousness. Non-clinical applications in sports performance studies were also proposed. The development of more reliable and efficient lucidity induction methods might broaden our understanding of the phenomenon of emergence of self-awareness.

Keywords: Neuroscience of consciousness • Lucid dreaming • Dream lucidity • Sleep study

Introduction

Reality checking, otherwise known as the Reality Test method (RT), is one of a lucid dream induction approaches where a person trains specific

cognitive tasks during the day to better differentiate between their sleep and waking state during subsequent dreaming. The RT method is designed to increase metacognition by habitual training of the mind to purposefully keep noticing one's awareness state [1]. Some more experienced lucid dreamers are also able to improve internal control over the dream itself, being able to influence the narrative of the dream events, behavior of dream characters and gaining agency over own actions and feelings while within one's dream. As such, some research has indicated that practicing lucid dreaming may be associated with improved psychological well-being when awake [2]. Other studies suggest that regular training of lucid dreaming techniques may improve one's sense of self-confidence [3]. Because lucid dreamers can gain control over what happens in their dreams, it's hypothesized that some characteristics of one's behavior may extend into their personality when awake. Further, it is also postulated that lucidity techniques can be used to improve a person's creativity or serve as a form of art therapy in various therapeutic scenarios [4]. Since lucid dreamers can create positive outcomes out of adverse dream scenarios by overriding the narrative, dream lucidity skills can also serve as an aid in recurring and debilitating nightmares by allowing the dreamer to gain the realization that the traumatizing content is just a dream [5]. Some practitioners also use the techniques to attempt self-healing, and others simply to experience more self-indulgent activities created for the sole purpose of fun and entertainment, like flying dreams [6].

Methodology

In this pilot research, 33 volunteers, all females, in the age range of 19 to 47 were recruited via online advertisement to learn and test a novel, proprietary protocol to be used for dream lucidity induction. Participants were split into three separate and equal groups for a comparative test between three different reality check methods used in this dream consciousness experiment. The third protocol was a proprietary variation developed by the author for the purpose of this study. All subjects successfully completed the entire study duration.

Materials included pre-test questionnaires and logbooks for the duration of 10 days of the study. The pre-test survey and evaluations were hosted online. The emails with the instructions were sent to the participants daily. An ethical review for this particular data collection process was not required in accordance with the local legislation and institutional requirements. The investigation was conducted in alignment with the Declaration of Helsinki. All participants were chosen based on expressing an interest in but declaring no prior experience with dream lucidity induction training.

The exclusion criteria for participating was applied, being it any mental or physical condition, including insomnia or other sleep disorders. Informed consent was requested and granted from all subjects, and assurance of anonymity was delivered in writing to all participants. The study was designed to adhere to the international standards of research and data collection protocols.

Results

All participants were asked to set an alarm clock on their phone every two hours and five times a day for a duration of ten days of the experiment. This was the first part of the new protocol, designed and intended to amplify the results. The purpose of this step was to apply the frequency criteria for daily reality checks so the method did not have to rely on the volunteers to spontaneously remember to practice the requested Reality Test (RT) check during the day. All volunteers were requested to use an alarm reminder sound on their phones that was gentle and short enough to not disrupt them in their daily activities, like school or work. A silent vibration reminder set every two hours was also allowed. This was to serve as a cue given to each participant to practice for a brief moment one RT method that was assigned to them.

In each of these three groups, in addition to performing a brief reality check at a cue set every two hours and five times a day, each person was to ask themselves quietly in their mind one question when doing their RT task: "Is it a dream, or is it a reality?" and then move to go about their day as usual.

The first group was asked to use a mirror as a reality check technique, where a person briefly checks their reflection or face in a pocket size or any available wall mirror to assess their look. In dreams, mirrors do not tend to reflect appearances appropriately because of the mind's difficulty to create accurate reflections [7]. Although not impossible, self-reflections rarely look accurate in dreams. Therefore, participants in the first group were requested to carry a small pocket size mirror or look into a nearby mirror every time their phone alarm or vibration sent them a cue. If the image they noticed appeared to be misshapen, blurry, or there was nothing reflected in the mirror, this method was to make them aware that they were presently dreaming.

The concern with this technique of building habitual reality check behavior, was that using a mirror in a dream might show distorted images and could frighten a person experiencing it, instantly awakening them from their dream [8]. This study, however, with its end surveys, did not confirm this concern. Through the daily mirror check method, lucid dreamers were encouraged to acknowledge their reality and state, which was then to serve as a habitual, regular self-check and an insight carried into their dreaming nighttime. Some proponents of this technique, go as far as suggesting that it can serve as an unconscious experiment to examine oneself and get to know individual insecurities, or reveal real-life beliefs about oneself with mirrors creating a connection between the unconscious and the conscious [9].

The second reality testing technique was the usage of solid objects, and how they act within the laws of physics. This method relies on the fact that physical laws are rarely applicable in the realm of one's dreams and solid objects passing through other materials is a possibility [10]. Therefore, subjects assigned to this method were requested to try pushing their hands against a wall at the sound of their phone reminder cue. Observing if their hands can pass through a solid object was to help a person verify whether they are dreaming or not. In the conscious state, the wall is impenetrable, whereas, in a dream, the hand might easily glide through the wall. Volunteers were also given a choice to use a variation of this technique by pushing their finger through their own hand, in case in their particular circumstances there was no wall they could reach anywhere nearby, with the same self-consciousness intention: to facilitate a habit of performing this method regularly in hopes for this cognitive exercise to also reappear in a dream content inducing lucidity.

Some other techniques that are common were not tested for the purpose of this experiment as the author personally found them less effective. One such example would be reading text method when determining one's conscious status or the possibility that someone is dreaming. The method is based on the observation that reading a sentence, looking away for a moment and trying to re-read it again, is not something lucid dreamers report as possible in their dreams. Often the sentence would change upon the second look or the text would just disappear, signaling that one is not awake. This technique, even though recommended by some practitioners was excluded from this study as the volunteers participating were not experienced lucid dreamers but novice at such experiments therefore the methods needed to be simple and involving objects or events that are frequently present in everyone's dreams; text and reading in one's dreams was not found to be such an element [11].

Another variation of this technique involves time, where a person looks at a timepiece. Alarm clocks and digital watches are familiar objects people use in their waking time. In a dream state, reading is often impaired. Numbers on a timepiece may move or change peculiarly, appearing out of order, blurry, or dim, making it very difficult to tell the time in one's dreams [12]. Therefore, when applying this variation of a reading time technique, potential outcomes of training to distinguish dream from reality might be more favorable. A similar mechanism as in reading and re-reading texts could apply here, where a person is encouraged to look away once and then look at the timepiece again. If the image is still the same, it is not a dream.

Ultimately, this technique was not chosen for testing in this study to induce lucidity for practical reasons, being that not everyone carries a watch with them and not everyone has their smartphone on them at all times.

The third and final technique tested for this dream lucidity induction study was based on the subjects looking at their own hands every two hours, and since all participants were females, to specifically notice one additional visual modality: the color of their nail polish. In dreams the shape of one's hands may look disproportionate or odd. One reason why this technique was favorable was because it only requires one's own hands, and when they do not appear familiar in shape, a person can acknowledge that they are dreaming.

Results revealed that 5 times per day RT hands technique with the additional color modality protocol was the induction strategy that achieved the most success. Interestingly, participants noted that they did not find the phone reminders annoying or burdensome to their daily routines. Keeping a morning dream journal, which was requested from all three groups starting 7 days before the study, also revealed a statistically higher dream recall for the third protocol when compared with the other 2 techniques. Reports of lucid dreaming in a 10 days testing window for the new protocol recorded 14 total occurrences of lucid dream recall among all participants in that group. The other two approaches have yielded 5 occurrences and 8 occurrences of bringing about dream lucidity for group one and two, respectively. The amount of time participants slept during the duration of the experiment or a factor of age, turned out to not be a successful predictor for dream lucidity frequency.

It is hypothesized that bringing one additional modality in the third protocol group to one's visual focus, specifically focusing on noticing a color, was significantly helpful in distinguishing irregularities between current vision and latest memory and thus between dream and reality. Some participants specifically reported that they gained awareness of being in a dream the moment they noticed their nails to not have any nail polish color on them while a part of their mind remembered that in reality they had pink or red as the last color they saw in their waking states. As predicted, the specificity of this modality had positive correlation to bringing on dream awareness.

Some volunteers noted that they slept better on the nights when they successfully became lucid in their dreams versus on nights they did not, however the study did not have appropriate questionnaires designed for tracking this particular variable across all groups. When comparing all three techniques, participants did not report sleeping longer or waking up feeling more refreshed in neither of the groups. Thus, the results did not find correlation between successful production of lucid dreams with self-reported sleep quality, but cannot exclude a hypothesis that unsuccessful efforts in inducing lucidity may have a negative impact on overall sleep quality or length as some previous researchers have indicated [13].

Discussion

Some research suggests that training in lucid dreaming might be of benefit to patients with anxiety, depression, PTSD or recurring and debilitating trauma-based nightmares [14,15]. Furthermore, it's been proposed that cultivating dream lucidity might bring to the practitioners other psychological health and cognitive benefits, like increasing daytime mindfulness and using dreams narratives as self-therapy to become more confident and relaxed in a waking life to increase the overall psychological well being [16]. Dream lucidity training has been also proposed as an alternative treatment for phobias and as an art therapy exploring one's subconscious mind [17].

On the other hand, when considering the negative spectrum of impact on an individual's health, there are still many unknowns that might call for caution [18]. Since the typical neurological processes that normally occur during the REM sleep phase may be altered during lucidity, it is a valid question to consider long term and unknown potential health risks as well [19]. Some other dream awareness studies attribute improved sleep quality to lucid dreaming. However this research found that dream quality reported was in no relationship with lucidity frequency or the lack of it, nevertheless the research was not designed to measure this particular correlation and the sample size of volunteers participating was limited.

Conclusion

This research highlights three various RT techniques that were tested for effectiveness to induce dream lucidity most reliably, including the solid objects RT, mirror RT technique, and the new protocol of observing one's hands with additional color modality added. Time checking methods, as well as reading and re-reading text techniques were excluded as less practical for the purpose of this study. The new protocol RT technique was found to be the most effective way to induce the highest frequency of lucid experience in this sleep survey experiment. Each of the three investigated methods had an added mnemonic component where a participant was asked to repeat in their own mind a question if it's a dream or a reality, when hearing the sound cue five times a day, which served to establish an intention carried into nighttime. This additional component was to essentially act as an internal aim set for oneself to question reality and might have contributed to all three methods as an auto-reminder and verbal target cue to habitually ask oneself a similar question while dreaming.

The results also suggest that the use of a gentle alarm sound set as the practice cue every two waking hours and up to five times a day was not found to be annoying or difficult to comply with by the participants. This routine structure of time intervals implemented was in opposition to typical RT strategies used in other studies, where volunteers are expected to spontaneously remember about the daily practice and therefore might end up practicing less frequently which affects compliance for finishing the study successfully. Overall this study serves as evidence that the novel RT induction protocol, with the additional color modality and the mnemonic intention added, increased the likelihood of inducing lucid dreams more successfully than the other two investigated strategies. Given the variety of clinical and non-clinical applications of dream lucidity, further research remains important.

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